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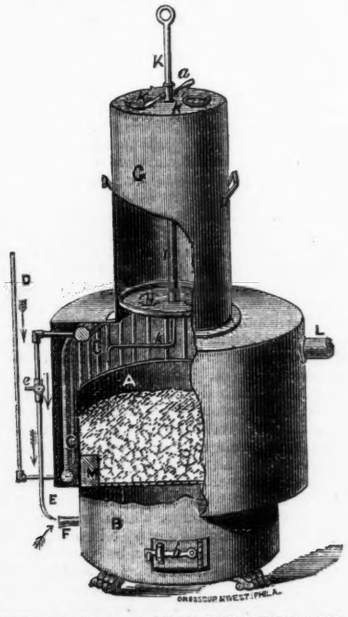
Kidd's Gas-Producing Furnaces.

IN gas producers, where solid fuel has hitherto been burned to carbonic oxide, it has been the rule to place a thick layer of fuel in a closed furnace and to allow the combustion to proceed slowly. In the lower part of the furnace carbonic acid gas is formed, which, in passing through the upper layer of incandescent fuel, takes up additional carbon. The hot gases are drawn slowly from the furnace up an ascension pipe by utilising the effect of a falling column of the gas in a cooler and denser condition. Attempts have been made to draw the gas from such furnaces with greater energy so as to quicken the process; but this has created a partial vacuum between the particles of fuel and caused the carbonic acid gas to pass through the fuel unchanged. In the improved gas furnace, designed by Mr. Kidd, of 12 Dartmouth street, Westminster, which forms the subject of the present notice, this is obviated by creating a pressure under, above, and between the particles of fuel, and causing imperfect combustion to take place under pressure.

The engraving subjoined represents a sectional elevation of a portable gas-producing furnace constructed on Mr. Kidd's plan. In this arrangement heat developed by the partial decomposition of the fuel is partly utilised in heating the steam generator C, and it is thus made to generate sufficient steam for the blast, which is discharged through the steam jet E. The steam escaping from this jet drives a current of air through the orifice F into the closed ashpit B and thence through and up the mass of burning fuel. The gas is checked at the outlet L so as to create a back pressure in the furnace. By this means, the combustion is made more intense, and the steam used to cause the blast is entirely decomposed into carbonic oxide and hydrogen.



KIDD'S GAS-PRODUCING FURNACE.

The gas escapes with sufficient pressure to enable it to be conveyed through pipes to the most distant part of any works. The steam generator shown at C is formed of vertical tubes connected together at the top and bottom. Water is supplied to this generator automatically (through a pipe D) from a tank sufficiently elevated to give a pressure of from 10 lb. to 20 lb. G is the fuel hopper and H H are movable covers for dropping the fuel into the furnace.

By the application of this invention to existing gas-producing furnaces, the patentees claim that imperfect combustion takes place so rapidly, that one furnace can be made to do the work of three; and that the gas generated contains a much larger proportion of combustible matter, the hydrogen being nearly doubled.

One object of this invention is to supply portable furnaces for producing a cheap-heating gas for domestic uses, cooking, etc., and for the various trades where illuminating gas is at present extensively used for heating purposes. This is of great public importance when we consider that the 10,000 cubic feet of lighting gas produced from 1 ton of coal at 4s. per 1,000 ft. cost £2 to the consumer, and that these 10,000 cubic feet only represent about 13 per cent. of the heating power of the coal.

Coal, coke, or breeze are objectionable in the portable gas producers just described, on account of the ash and clinker they leave in the furnace, and the sulphur and other impurities given off. The fuel best adapted for this purpose is high-dried or charred peat, which leaves no clinker or other deposit in the fire-box, and gives off about 200,000 feet cubic of a perfectly pure, inodorous, and permanent gas from each ton of fuel, a gas which in burning will not tarnish the brightest vessel when brought in contact with the flame.

During the past two years the patentees have been perfecting a process for making this fuel cheaply, and have satisfied themselves that it can be produced in quantity at a price ranging from 10s. to 15s. per ton, according to locality. We understand that works for producing charred peat by Mr. Kidd's process have been erected on the property of His Grace the Duke of Sutherland in Scotland, and also on the extensive moss at Crowle, near Doncaster.

Mr. I. Lowthian Bell's Opinion of American Iron Manufacture.

AT THE Annual Meeting of the British Iron and Steel Institute, Mr. BELL read a paper, from which the following are extracts, on his opinion of the present condition of our iron manufacturing industries:

Mr. BELL began by saying that in the year 1871, one-half of the iron produced in England was exported to foreign countries, and one-fourth of this half was despatched to the United States, in all about 750,000 tons. In the year 1874, however, the States took only 130,000 tons, and it was stated that during the three years the producing power of that country had risen from two and a-half millions to four millions of tons. It is a matter of great interest to the British iron-masters to learn whether this extraordinary growth is due to the stimulus of our own excited markets, and whether the increase can be actively employed when iron falls in value to what experience has accustomed the world to pay for this commodity. In touching upon the question of transport, which so nearly relates to the manufacture of iron, he said that the raw material in America has to be carried over distances quite unknown in this country. This applies also to the manufactured product. A great deal is done by water, and as an instance, he gave the cost of conveyance of coal from Pittsburgh down the Ohio. Twenty thousand tons of this mineral are sometimes embarked on board a flotilla of flat-bottomed boats, and conducted by one steamer, for a distance of 1600 miles, at something under 1s. per ton, which includes the cost of bringing back the empty barges. The entire question of internal intercommunication of the United States has experienced great changes in consequence of the enormous development of the railway system. The Hudson River, which is accessible by the Great Eastern railway for seventy-five miles above New York, has a double line of rails running alongside its stream beyond the city of Albany. Thus the locomotive has not only, in many cases, displaced the marine engine, but it has brought mineral districts into communication with each other, which, without it, would, in a great measure, have remained useless. A limited quantity of charcoal iron can be, and is, produced from the rich ores of Lake Superior, the Iron Mountain of Missouri, and Lebanon in Pennsylvania; but the quantity would have remained insignificant had the rail not enabled these minerals to be conveyed to the coal of the Shenango and Mahoning Valleys, and to those of the Lehigh, Delaware, Ohio, and others. The railway system has grown into dimensions far exceeding those in England, the land of its birth. At the end of 1873, the United States had 70,651 miles of road, against only 16,082 miles in England. The average cost per mile in the latter has been £36,582, and in America not one-third of that sum. In the latter case, however, the Americans have had the advantage of getting their land for a mere trifle, but they have had to contend with scarce and dear capital, and with materials and labor far more costly than in England. They have not constructed such substantial lines, however—the convenience of the many being allowed to override the possible injury to the interest of the few. The working charges in the States absorb 65·1 per cent. of the gross earnings, and in this country only 53 per cent. The rates of carriage also vary, some lines charging 1½d. per ton per mile, and others only ½d. Looking at the fuel consumed in the manufacture of iron in America, Mr. BELL first referred to charcoal, and remarked upon the large quantity of forest land to be found. In the earlier history of the iron trade it was almost exclusively used in the blast-furnace, and even in 1854, one-third of the pig-iron produced in the United States was smelted in the charcoal furnace, or about 300,000 tons; now it is 500,000 tons, or one-fifth of the entire make. It is most used for railway carriage wheels. The prices of charcoal vary according to the district, and Mr. BELL gave instances. He spoke of the system of weights and measurs employed in the American ironworks, and said that this is one of the few things which the people there had done badly. Not content with introducing our unmeaning ton of 20 cwt. of 112 lb., they have two distinct tons, one of 2000 lb., and the other of 2440 lb. Mr. BELL calculates that 46,000 acres of timber fall annually to provide fuel for the charcoal furnace. Less than 200 acres of a four-feet seam of coal, in the county of Durham, would produce the same weight of coke as is obtained from 40,000 acres of American forest. Coal is more abundant in the United States than in any other part of the world, and all kinds are found. In some places natural gas is used for puddling, reheating, etc. Of pit coal itself there are 192,000 square miles, as compared with 8,000 square miles in the United Kingdom; and Mr. BELL thinks it may be doubted whether there is any similar area in the world in which a larger proportion of the surface is occupied by coal-bearing strata. The anthracite fuel is much used in the blast-furnace; indeed, out of 2½ millions of tons of pig iron smelted last year, about one-half was the product of furnaces burning anthracite. From the position which these beds of

anthracite coal occupy, it would appear as if, after their original formation, an enormous amount of lateral compression had been experienced by the districts in which they lie. This force has raised the strata into a succession of waves, as it were, the slopes of which vary from an angle of 20 to 40 degs., and occasionally descend to a depth of 200 to 250 fathoms or more. In some cases, this compressive power has been so great as to have forced one ridge back over its neighbor, to such an extent as to convert what is the floor of the seam in one place into the roof at another, and, from a similar cause, the quantity of coal which has accumulated at the anticlinal axes of some of these coal undulations is so great as to afford a face of 40 to 60 feet, or even more, in thickness. In some cases denudation has carried off, not only the sandstones and shales, but a portion of the coal itself; the bared edge of the seam is found immediately under the alluvial matter of the surface. The coal is sometimes quarried; indeed, at Mauch Chunk, there is an open quarry of coal ten acres in extent, the face of the seam having a height of 70 feet. Peculiar appliances are necessary for extracting this coal, and Mr. BELL described them briefly. The largest blocks known as "lump" coal are chiefly consumed in the blast-furnaces, the others go for various purposes. The "stove" coal is that used for domestic fires, and commands the highest price. Anthracite coal is regarded as a natural coke, as it often contains as much as 93 per cent. of solid carbon. The height of the seams and the nature of the "thrust," by working out the support of a roof lying at a high angle, is the cause of great loss in "pillars," 25 per cent. of the whole contents of the seam being the average. The American coal-master has also to contend with a considerable quantity of small, which is entirely valueless, and many acres of land, near the older pits, are covered with it. Sometimes as much as one-half of the whole produce of the mine is thus rejected, but the average is about 20 per cent. of the coal actually drawn. The men engaged in the anthracite mines work from eight to ten hours per day, and are paid on a sliding scale, according to the selling price of coal. Describing bituminous coal, Mr. BELL stated that this is worked without producing much small, and is largely used in a raw state in the blast-furnaces in the Mahoning and Shenango Valleys. In the eastern coal-fields, near Pittsburgh, a celebrated coking-coal is raised. Near Connellsville, the seam is 10 or 11 feet thick, and the coal lies so soft in the ground that a man, without the use of powder, can shovel a ton an hour into the trams. The entire produce of the mines is converted into coke, and this is considered the best of any in the United States. Mr. BELL, however, thinks that it is greatly inferior to Durham coke. The cheapest coal he heard of is obtained for supplying one of the large ironworks, and, exclusive of royalty, it is delivered at the furnaces for about 3s. per ton. After describing the coal in the various fields, he went on to consider another item of iron manufacture, viz., the supply of flux for blast furnaces. He stated that there is a vast extent of carboniferous or mountain limestone in America, frequently very near the pig iron works. Near Baltimore, the shells of oysters, which are found in great abundance at Chesapeake Bay, are used. They contain 95 per cent. of carbonate of lime, and are a very inexpensive substitute for lime itself. The United States contains abundant quantities of iron ore of all kinds except the spathose ore, which is very scarce, even in Europe. The ironstone of the liassic and oolitic seams, which furnish about one-third of the pig iron made in the United Kingdom, seems to be entirely wanting in the States. The speaker described first the magnetic iron ore of Lake Champlain, its peculiarities, mode of disposition, etc. Relative to the specular ore of Lake Superior, which is valuable from the cheapness of its extraction, its abundance, and its freedom from deleterious ingredients, he remarked that the contents of the mines are chiefly obtained by open quarry work. The ore yields something like 67 per cent. in the blast furnace, and is pure enough for the manufacture of Bessemer iron. Mr. BELL next noticed the Iron Mountain deposit. It is of easy reduction; indeed, a furnace only 40 feet high, with boshes of 9½ feet, blown with cold air, will make 100 or 120 tons per week of gray iron, with less than 24 cwt. of charcoal; with moderately hot air, 150 tons per week can be run with 20 cwt. of fuel. The yield of the ore may be taken at 65 per cent. The author then described, in detail, various deposits of limonite, or brown hæmatite, which he saw, and afterwards touched upon those of red hæmatite; clay and blackband ores also came in for a share of attention. Mr. BELL, in treating of the blast furnaces, referred first to the establishments which have been founded for promoting scientific training and education, and he spoke very highly of the earnestness and devotion which characterizes those engaged in the mining and metallurgical industries of the States. He criticised the various matters in which he thinks an improvement might be made and recommended those worthy of adoption in this country. He stated that the Lehigh makers are a little behind the age in the question of fuel. In furnaces 55 feet high, with boshes of from 17 feet to 18 feet, the anthracite used in smelting an ore yielding 50 per cent. with 12 cwt. of ironstone was about 35 cwt. Perhaps this was due to a want of sufficient temperature of the blast, and to the insufficient height of the furnace. Where ironmasters had been bold enough to erect furnaces 72 feet high, their enterprise has proved eminently successful, for the fuel consumed has been reduced to 25 cwt. per ton of iron. In the matter of wages, skilled men are paid at rates below their brethren in England. Their furnace-keepers, in 1874, received 8s. 6d., against 10s. and 12s. paid last year in the North of England. As a rule, in the States, they have more men employed to do the same work, and this, added to some superiority in arrangements, enables English makers to smelt a ton of iron for considerably less than the amount paid in wages in Pennsylvania. MR. BELL spoke highly of their blowing machinery. He states that the make of the 55 feet and 60 feet furnaces of gray iron may be taken at 200 tons, and that of the larger at 300 tons per week. Remarking on the very large make of some of the Pittsburgh blast-furnaces, MR. BELL stated that their whole secret lies in forcing the air into the furnace at a high pressure, 8 lb. to 9 lb., and in immense volume. The ready reducibility of the ores is also favorable to a large make. Going on to the malleable ironworks, MR. BELL remarked that the quantity of pig-iron puddled is less than in this country, as a large quantity of old rails are annually worked up in the mills. The greatest number of puddling furnaces in any one establishment is at the Cambria Works, at Johnstown, Pennsylvania, but they cannot turn out above 600 tons of puddled iron per week, although their make is equal in steel and iron rails to 100,000 tons a year. In the States there are 899 double and 2063 single puddling furnaces, which together only produce 2,000,000 tons of puddled iron, or 1,750,00 tons of finished iron. The prices for puddling vary considerably in different localities. In Troy, the rate is as low as 19s. per ton, in the Lehigh Valley 21s. 9d. is paid, and at St. Louis and Chattanooga 24s. 6d. At Pittsburgh 22s. 7½d. was paid at the time of MR. BELL'S visit. He could not give a very satisfactory account of the progress of mechanical puddling in America. He referred at length to the DANKS process, and stated that during his visit to Messrs. GRAFF, BENNETT and Co.'s, where it is in operation, the work was going on in a satisfactory way, but the furnaces were not used at night. MR. BELL believes that rotatory puddling will ultimately be achieved, and it may be the result of some modification of the apparatus invented by MR. DANKS. Whenever hand puddling is superseded by mechanical means, MR. DANKS will deserve great credit for the assistance he has already rendered, not only in perfecting the furnace itself, but in devising other appliances required in manipulating large masses of iron. MR. BELL noticed the three-high rolls in finishing mills, which are in the United States very generally adopted. The next subject for remark is that of the manufacture of steel. The make, last year, of Bessemer steel reached 175 000 tons, of which 135,000 tons were used for Bessemer rails. At the Bethlehem Iron Works, MR. BELL saw hot ingots of steel, weighing a ton each, taken direct to a Siemens furnace, out of which they were charged and drawn by means of hydraulic cranes. When at a suitable temperature, the ingots were brought to the cogging-mill, which was provided on each side with feeding-tables, the invention of Mr. FRITZ. These tables consist of two strong frames, the breadth of the iron rolls, and long enough to support the ingot when rolled out. The frame is furnished with a series of rollers, and supported on the standards themselves is also a roller, the latter forming thus a continuation of the platform of rollers placed on the frames. A man at a small double-cylinder engine is able to set the whole of the rollers on the two feeding-tables, as well as those carried on the standards, in motion, which he changes at will, by simply reversing his engine. As soon as the ingot is partially on the table the rollers are started, and the ingot is propelled towards, and drawn through, the rolls, when it is received on the table behind the rolls. The moment this is done, a second man, by means of hydraulic machinery, raises the two tables to the level of the grooves formed by the middle and top roll. While this is being done, powerful screws reduce the aperture in the rolls, and the ingot, by reversing the rollers, is passed to the front, when the feeding-tables are lowered again to their original position. Underneath the front feeding-tables is a traversing frame, to which movement, by hydraulic pressure, can be communicated parallel to the rolls, and at right angles with the rollers of the table. Attached to this traversing frame is a row of five strong bars coming through between the rollers, and bent at the top ends at right angles. By the use of hydraulic power, these bars can be raised and lowered, so that, by means of the traversing frame, they are made to travel at will between the rollers, and pass up through them. The moment the ingot is lowered on the front feeding-table, the bent ends of the bars catch it on the left-hand edge—looking towards the rolls—and turn it over, the traversing frame moves to the right, and the five bars, now projecting above the feeding-table, push the ingot opposite the second groove. The rollers are set in motion, and the ingot is passed through the rolls as before, and this is repeated for each groove in the rolls. In this way the ingots are reduced to the size fit for the finishing mill, without a man ever touching them. After being in suitable lengths, they are charged, while hot, into a second Siemens furnace, and heated for the rail mill also, with 3-high rolls, and a masterpiece of rolling machinery for strength and accuracy. MR. BELL thinks that all that can be said of the blast-furnace process, and the malleable ironworks of America, is that they are keeping fairly up with the British, but, in the Bessemer works, we must look to the United States for superiority of arrangement and some improvement in machinery over our own. He considers the Americans, like ourselves, have done nothing in imitating the French by running the iron from the blast-furnace direct into the converter. Little or no steel was being made in America by the Siemens-Martin steel process. An establishment had been erected on the banks of the Monongahela River, near Pittsburgh, for carrying on the BLAIR process of making steel. In principle there is no novelty in Mr. BLAIR'S method, which consists of deoxidising ore and melting the iron sponge so obtained in an open hearth with pigiron. The first step in the process has been tried over and over again by CHENOT, and others; and Dr. SIEMENS has paid an immense amount of attention to the second. The consumption of charcoal and fuel was considerable, and did not seem to be a good substitute for the combined action of the blast and puddling furnaces. Mr. BELL thus describes the BLAIR process: "Mr. BLAIR conducts the operation in an upright retort, but circular in section, 4½ feet in diameter, and 40 or 50 feet high. In the upper eight or ten feet, however, is inserted a metal pipe about 3½ feet in diameter, so that for this distance from the top the working space is an annulus 4½ inches across. Heat produced by burning carbonic oxide, obtained from a Siemens producer, is applied to the outside of the retort, and heat is similarly communicated to the inside of the 3½-feet pipe. Ore and charcoal are charged into the top of the annular space, which is thus exposed to heat from the out- and inside, instead of, as with Chenot, having the heat only applied to the exterior. The sponge is retained by Mr. BLAIR, as with CHENOT, in the lower portion of the pipe, which is kept closed until it cools. One such retort as that described gives about 2 tons of sponge in twenty-four hours. The difficulty which besets this and all other modifications of dealing with iron in so fine a state of division as it exists in iron sponge is its proneness to oxidation. Hitherto, it seems to me, the direct process, as it is termed, has met with the most success at Landore. The pig-iron, after being melted, has blocks of ore thrown in; the carbon and silicon of the bath reduce the oxide, and the metallic iron is instantly taken up by the bath of liquid metal. Very different must be the action on sponge, which, when thrown into the furnace, will float on the melted pig, and, being exposed to carbonic acid at a very high temperature, will, to some extent, infallibly be reconverted into oxide. So far as I was able to learn, two parts of pig iron and one of sponge lost about 20 per cent. in the furnace. Now, if it be true, as I have heard stated, that a mixture of wrought and pigiron can be fused in an open hearth with a loss of 6 per cent., it follows that a considerable portion of the sponge used in Mr. BLAIR'S process must reconverted or reoxidised. The specimens of steel I had an opportunity of examining indicate entire success, so far as a mere question of quality in the product is concerned. There seems to be no doubt that, in obtaining the sponge iron, Mr. BLAIR has made a notable step in advance of M. CHENOT, and I am far from wishing it to be understood that I indicate an unfavorable opinion on the future commercial merits of the scheme. Mr. BELL then considered the labor question, noticing the varying amounts of wages paid in the different districts. While in one locality an iron ore miner is paid 12s 9d. per day, in another he is satisfied with 4s. 8d. In other districts, especially in the South, the iron mines are worked by convict labor. The wages must necessarily be higher in the States than they are here, as the cost of living is so much greater. Mr. BELL referred at length to the question of import and export duties. He states that he is fully aware how unpopular, among a great number of the iron manufacturers, a reduction of the present tariff would be—indeed, they rather seek to add to the restrictions it already imposes. In the United States itself, the opinions are very largely divided as to the benefit of protection, as applied to native industry. The protectionists frequently argue that we ourselves retained protection to native industry, until we felt that we were independent of foreign competition; and now that we no longer fear this, and require the necessaries of life for our people we are found crying out for free

trade. They appear to overlook the fact that the chief opponents to free trade in England, thirty years ago, had as much reason to fear foreign competition as any branch of industry in the States need dread the importation of British iron. Mr. BELL gave instances of what had been the effects of protection in the manufacture of iron. Soon after 1871, the price of iron commenced to rise in England. At that period, something like one-third of the metal consumed in the United States was imported from England. The change in value here at once made itself felt in America, and foundry iron was commonly sold at £10. This remarkable change led to an immediate increase of blast furnaces, many new ones being added by the end of 1873. Mr. BELL concluded his paper by dwelling at length on the benefits of free trade, and combated certain arguments enunciated to the contrary by the Secretary of the American Ironmasters' Association.

Phosphorus Steel Making.

M. F. GAUTIER, Engineer of Mines, France, gives the following useful sketch of the various methods for producing phosphorus steel, or, to use a more correct definition, phosphorus cast metal. This metal, says M. GAUTIER, cannot be employed in industry except on condition that it is nearly deprived of carbon, consequently every process which will yield extra soft steel will, with inferior materials, produce phosphorus cast metal.

THE BESSEMER PROCESS.—1. *The ferro-manganese process practiced at Terre Noire.*—The silicious pig iron used contains but little manganese; the first stage, that which precedes the appearance of the yellow ray in the spectroscope, lasts about a quarter of an hour, according to the richness of the pig iron in silicon. There is no explosion, the flame is pure, without smoke; the completion of the operation is positively marked by the disappearance of all the rays of the spectroscope, with the single exception of the yellow sodium ray. For the production of extra soft metal, the refining is prolonged for about twenty seconds, the blast is stopped, and the converter is laid on its side. Manganese iron, previously heated to redness, is then thrown in by means of shovels, taking care that the pieces pass through the scoria and enter the metal. The manganese iron used is an alloy containing a little carbon; the manganese in it reduces the oxide of iron in the converter, and the greater part of the carbon is converted into oxide of carbon in the form of brilliant flames. When the agitation ceases, the charge is drawn. The metal is even and quiet, without bubbles or other irregularities; and, which is of essential importance, the product is always equal and regular in practice. This is the method also which is adopted at the Seraing works, with the same manganese iron.

2. *Swedish method, with highly manganiferous pig iron.*—The pig iron used is without silicon, but rich in manganese, the proportion running from 4 to 5 per cent. The character of the operation is such that there is not what is called a first period; the yellow ray appears at once. There are abundant explosive projections, which would render the process ruinous if care were not taken to have enormous converters relative to the quantity of metal treated. The flame is veiled by smoke and gases, the principal of which is oxide of manganese. It is difficult to control the operation; for if the temperature be reduced by additions of small quantities of steel and iron, the object is not attained, for the heat must be retained in order to keep the metal in such extreme fluidity as will permit the oxide of iron to separate itself and arrive at the surface, for no addition is made of spiegel. The work is carried on blindfolded, for the intermittent flashes of flame are blinding; the heat caused by the explosions is annoying, and the spectroscope is misleading. From time to time, samples of the scoria have to be drawn to find how matters are proceeding; after a certain amount of experience, the state of the metal is ascertained by the behavior of metallic globules under the hammer, and from the color of the scoria. But the results are uncertain, and have to be classified. The ingots, moreover, are liable to shrink and to become flawed. This mode is adopted at Fagersta, in Sweden; at Zwickau, in Saxony; and Maxhütte, in Bavaria; but it requires all the value that attaches to the production of extra soft steel to induce any one to continue a method so uncertain.

3. *English method, that of spiegeleisen by explosion.*—In this process, silicious pig, such as that of Cumberland, for example, is employed, and the operation is carried considerably beyond complete decarburization. In order to succeed, a certain quantity of oxide of iron, neither more nor less, must be produced in the bath, and which carries off by explosion the carbon of the spiegeleisen which is added. This instantaneous production of oxide of carbon is dangerous, a part of the metal, and sometimes the whole charge, being projected out of the converter, and endangering the operator and his men. Generally the product is soft, but it is liable to flaws, which are not much felt in sheet iron, but which unfit it for rails. Steel makers will choose whichever of these three methods appears to them the most advantageous for the production of phosphorus steel with pig iron of second quality. M. GAUTIER adds: The Bessemer process is destined to lose much of its importance in presence of the certain and unlimited extension of the Martin-Siemens process, which, he considers, will take the lead in future, and regulate prices. It is capable of using up old iron, and employing all kinds of ore, for puddling is still the only known method of practically getting rid of the greater part of the sulphur and phosphorus; while the Bessemer process, requiring silicious pig iron containing little sulphur, must always be of a limited application. The true mode of making phosphorus steel is then in the sole furnace.

II. THE MARTIN-SIEMENS PROCESS.—In this method the matter is more simple. In order to produce extra soft metal there is but one way, that is to say, to act chemically upon the oxide of iron in the bath. Manganese iron must be resorted to, as spiegel always gives hard products; the proportion is the same as in the Bessemer process, namely, 1 per cent. of the whole, or about 2 per cent of manganese iron to 40 or 50 per cent of useful metal. When a sample is procured which bends perfectly when cold, the manganese alloy heated to redness is added, the bath is stirred slightly, and the charge run off.

An account, by M. GAUTIER, of the process followed at Zwickau and Maxhütte, supplies a striking confirmation of the fundamental properties of phosphorus steel; you may introduce phosphorus into cast steel on condition of eliminating the carbon, and the less the amount of the latter, the greater may be that of the former. Practically, by the German method, which is really but that of Fagersta applied to less pure materials, metal is produced which may almost be said to be without carbon, and, as no spiegel is introduced, there is no element of recarburization. It is not, then, astonishing that the metal thus obtained should be perfectly malleable and yet contain a notable proportion of phosphorus, that is to say, half the quantity which may be tolerated in a truly soft steel, when produced in a Martin-Siemens furnace with manganese iron.—*Scientific American.*

Production of Bromine.—According to WAGNER'S *Technologie Chimique*, there are at present manufactured 1,200 quintaux (say 120,000 lb.), of which Germany produces 500, America 500, Scotland 150, and France 50 quintaux.

American Geographical Elevations.

As geographer in the Rocky Mountains Expedition under the charge of Dr. F. V. HAYDEN, Mr. Jas. T. GARDNER found it necessary to fix upon some datum point to serve as a base for the reckoning of altitudes, and met with a first difficulty in the different altitudes assigned to Denver, Colorado, they diverging between 200 and 300 feet. To eliminate the error, he undertook the "reconstructing of all possible lines of level from the ocean to the Rocky Mountains, using only official reports by engineers, and checking them by personal examinations of their note books and working profiles whenever practicable." The following are a few of the levels ascertained:

	feet.
Mean level of Lake Ontario above mean tide level	279·99
" " Erie	583·08
" " Huron	589·99
" " Michigan	589·15
Low water in Ohio at Cincinnati	440·00
Cairo city base, ordinary low water	291·23
St. Louis directrix	429·29
Omaha, low water base of U. P. R. R.	977·90
" depot grounds	1060·40
Denver, Col., O. P. & K. P. R. R. passenger depot	5196·58
Cheyenne, U. P. passenger depot	6075·28
Golden, Colorado	5728·98
Ogden, Utah, depot track	4403·30
Pike's Peak	14,148·66

The level mean tide at Albany, N. Y., above mean tide at New York City, was taken at 4·84 feet, as ascertained by the Coast Survey. A few others of the hights are:

	feet.
Quebec, mean tide level	15·37
Montreal, summer water level	30.00
Lake Champlain, mean level at Whitehall	100·84
Pittsburgh, Pa., low water in river	699·20
Louisville, Ky., low water above Falls, about	404·00
New Albany, Ind., low water in 1857	379·75
" depot of L. N. A. & C. R. R.	451·75
Rock Island, Ill., high water in Mississippi in 1852	566·68
Terre Haute, Ind., high water in Wabash	485·55
" ordinary water	467·45
Mount Lincoln, Colorado	14,296 66

Natural Gas and Air Blast in the Puddling Furnace.

AT the invitation of Messrs. ROGERS & BURCHFIELD, last Friday we visited their works at Leechburg, which have become so famous from the use of natural gas in the operations incident to rolling mill practice. These works are situated on the right bank of the Kiskiminitas, about six miles above its junction with the Allegheny river. There are five puddling furnaces, with two more building, six heating furnaces, six trains of rolls, two steam hammers, one refinery, two knobbling fires, two annealing furnaces, and one "stack" for terne plates, and two building for tin plates. All of the heat and power required for this mill is from gas, excepting, of course, the charcoal used. This gas comes from a well in a ravine on the opposite side of the river, which was sunk for oil, but produces only gas and a small portion of salt water. The well was sunk some three years ago to a depth of 1,250 feet, when it was abandoned, and for two years millions of cubic feet of gas were wasted. A little more than a year ago, the well was bought by Messrs. ROGERS & BURCHFIELD, and the gas conveyed across to their mill, a five-inch pipe being used. In the freshet last spring the bridge on which the pipe was laid was carried away and a three-inch pipe is in use temporarily, but through this more than enough gas crosses to run the mill, a large portion going to waste.

In using the gas in the ordinary puddling furnace the only change made has been to brick up the bridge, the gas being fed to the furnace through iron pipes, and the firing being done with a piece of lighted paper, the supply being regulated by an ordinary gate. The result is that the heat can be controled at will without any more attention than the mere turning of a gate, and as fully a third of the labor at the puddling furnace is keeping up the fire, this is no inconsiderable item. It will also be readily seen that the complete absence from the fuel of any deleterious substance must have a great effect on the purity of the iron. The gas is a pure carburetted hydrogen, differing in this from that produced in the Siemens furnace, which is almost devoid of hydrogen.

In addition to the use of gas, Mr. ROGERS has lately introduced an improvement that seems productive of most astonishing results. What these are we can only indicate at present, but as Mr. ROGERS has kindly consented to allow of a series of experiments, we will give completer details in a future number. The improvement consists in blowing a blast of air upon the iron in the "pool" of the puddling furnace as it begins to boil. The pipes conveying the blast are carried in at the top of furnace, and strike the molten metal at an angle with the surface of somewhat over 90°. At the time of our visit, a furnace fed with gas and with the arrangements for blast as described, was charged with 460 lb of Lucy forge pig, and a small amount of what the boiler called "scrap tap," that is, the cinder from the "knobbling fires." During the week, up to Friday noon, less than 500 lb. of ore had been used in feeding the furnace. No cinder was used when the iron began to boil, but the blast was put on and the boiling was complete, the cinder in the iron flowing liquid. The furnace is charged for the first heat at 3:30 A. M., and the first turn is through with five heats at 11; the second turn at 7 P. M.; the average of the five heats with 460 lb. charge being about 2400 lb.

The quality of the iron is somewhat wonderful. With the ordinary gray coke iron, sheets for tin plates, equal to those from the best charcoal iron, are made at a cost of $50 per ton less. The knobbling fires are dispensed with, and all their iron made with the use of gas and blast. Want of space prevents us going more into details this week, but in a future issue we expect to give the results of some careful experiments.—*American Manufacturer.*

Campbell and Rickards' Pipe Proving Machinery.

IN a note on Messrs. CAMPBELL & RICKARDS' pipe testing machines, last week, we stated that one of these proves "20-inch pipe in 37 minutes." This should have read, proves *eleven* 20-inch pipes in 37 minutes. The omission was so evident, we doubt not our readers all noticed it; but few, probably, gave these machines credit for the amount of work they do, as above stated.

THE ENGINEERING AND MINING JOURNAL.

NEW YORK, SATURDAY, MAY 22, 1875.

RICHARD P. ROTHWELL, C. E., M. E.,
ROSSITER W. RAYMOND, Ph. D., } Editors.

NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. RAYMOND will be signed with a star.

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The Port Henry Furnace and its Whitwell Hot Blast Stoves.

THE Port Henry furnace (Cedar Point Iron Company) will blow in about August 1st. It is proposed to use anthracite coal and the new-bed ore with the expectation of making Bessemer pig. This is the ore so successfully used at the Fletcherville charcoal furnace, (in a former number of the journal we gave an analysis of this exceptionally pure Bessemer pig), where the first iron was made that was converted into Bessemer metal in this country, it having been used in the proportion of one-third Fletcherville to two-thirds Western iron. Our readers will recollect that this Port Henry furnace is the first in this country that has put up the Whitwell hot blast stoves, and their working there will be watched with great interest by our iron manufacturers generally.

Meeting of the British Iron and Steel Institute—Honor to Peter Cooper.

WE give this week an abstract of Mr. BELL'S paper on American Iron Metallurgy, and purpose publishing next week the President, Mr. MENELAUS', paper on "Rotary Puddling." The meeting appears to have been a very interesting one, and the papers referred to will be read with profit by our American ironmasters. The *Iron and Steel Institute* numbers 748 members, and 84 aspirants, or associates. It is the most vigorous and enterprising of foreign scientific industrial societies. It occupies in England the position the *American Institute of Mining Engineers* does here, and evinces the same vitality that characterizes our younger society.

Mr. BELL referred in very complimentary terms to his reception, last summer, in this country, and in his usual careful and impartial manner criticised what he saw here. We refer to another column for these interesting remarks.

We note with especial gratification the election to the honorary membership of the Institute of our worthy fellow-citizen, the venerable PETER COOPER. The English Institute is very chary in making honorary members. With its last election it has but eight, and among those are Professors TUNNER, of Leoben, Austria, and GRUNER, of Paris, who are two of the four honorary members of our American Institute. In proposing the name of Mr. COOPER for this honor, Mr. BELL referred in very flattering terms to his princely gift of the Cooper Institute for the promotion of popular scientific education. We congratulate Mr. COOPER on this new and well-deserved honor, and the Iron and Steel Institute on the credit it has done itself in recognizing the worth of one whom the whole country holds in honor.

The Labor Question in Massachusetts.

NO MORE interesting or valuable report on the remuneration, cost of living, and general condition of the laboring classes has ever appeared in this country, than the admirable "Sixth Annual Report of the Massachusetts Bureau of Labor Statistics," by CARROLL D. WRIGHT and GEO. H. LONG, Esqrs., of Boston. 1875. Though the subject may be thought a dry one, we assure our readers that the perusal of this book will be found interesting and valuable. From its suggestive pages we take many of the facts on which we base the following remarks.

It has at all times, and by every people, been admitted that a man should receive in exchange for his labor not only a sufficiency for present living necessities, but that he should receive such an excess over and above this as, with the accumulations of years, would provide for his wants when, through old age, his ability to labor had failed. Under the patriarchal form of government, the Chief required the services of his subjects, and, in return, he was bound to provide for them, in sickness and old age as in youth and health. To go no further back than to the time when the labor of a large part of our country was "involuntary," the master was bound to provide for the bodily wants of his slaves after their laboring powers had ceased through age or other cause. In fact, the principle, though but imperfectly practised, may be assumed as universally acknowledged, that "*a man's labor should be worth, and his wages should be as much as, with proper economy and prudence, will comfortably maintain himself and family, enable him to educate his children, and also to lay by enough for his decent support when his laboring powers have failed.*" This principle being then admitted in theory, it becomes of great interest to know how near the practice approaches theory in this respect. The following tables give the results of an infinite amount of labor and study bestowed on this subject by the Massachusetts Commissioners:

Classification.	Number of Families.	Persons to each Family.	Father's average yearly earnings.	Wife's average earnings.	Children's average earnings.	Average combined yearly earnings.	Average yearly cost of living.	Average yearly surplus or saving.
Nationalities.								
American	125	4·33	$720 50	$190 00	$278 26	$892 98	$770 02	$122 96
English	80	4·99	605 28	248 00	247 68	818 92	758 48	60 44
French	2	7·00	468 00	....	318 00	786 00	686 06	99 94
French Canadian	29	5·59	430 84	197 07	222 24	759 85	554 16	205 69
German	26	5·50	498 96	383 00	201 46	703 38	591 27	112 11
Irish	133	5·80	404 37	182 50	240 00	701 02	831 01	78 99
Scotch	2	5·00	490 00	....	420 00	910 00	....	....
Totals and Averages	397	5·14	$574 89	$222 75	$321 22	$762 72	$738 00	$24 72
Occupations.								
Building trades, skilled	57	4·46	$723 86	$90 00	$298 00	$814 32	$785 62	$28 69
Boots, Shoes and Leather, skilled	39	4·77	560 51	240 00	239 86	736 93	736 93	....
Metal workers, skilled	61	4·54	745 11	....	287 65	803 00	803 00	....
" " unskilled	17	4·59	458 53	....	238 46	697 46	697 46	....
Mill operatives, skilled	35	4·07	508 30	379 17	227 47	779 35	779 35	....
" " unskilled	42	5·88	382 05	....	241 58	665 94	654 90	11 08
" " overseers	4	5·25	965 00	....	190 00	1,155 00	1,027 52	127 48
Outdoor employments, unskilled	108	5·86	446 71	143 33	209 03	689 44	677 22	12 22
Shop trades, skilled	24	4·88	704 85	....	298 33	864 44	833 00	30 54
" " unskilled	10	5·90	424 60	....	210 37	555 90	643 06	12 84
Totals and Averages	397	5·14	$574 89	$222 75	$321 22	$762 72	$738 00	$24 72
Kind of Labor.								
Skilled	216	4·67	683 05	249 44	$358 72	$886 81	$784 63	$102 18
Unskilled	177	5·72	433 69	143 33	201 94	687 05	674 56	12 49
Overseers	4	5·25	985 00	....	400 00	1,190 00	1,027 52	162 48
Totals and Averages	397	5·14	$574 89	$222 75	$321 22	$762 72	$738 00	$24 72

It would appear from this report that but 35 per cent. of the heads of families are able, by their individual earnings, to supply their families needs, while 64 per cent. rely upon the assistance of wives and children. But 12 wives in the 397 families were employed in other than domestic duties, and their earnings are, in general, so small, that "they would save more by staying at home and attending to the care of their children and houses."

Of children there were 325 at work, or rather less than an average of one to each family. The ages of these were: 1 under 10 years; 4 of 10 years; 7 of 11 years; 35 of 12 years; 53 of 13 years; 77 of 14 years; 54 of 15 years; 59 of 16 years; 31 of 17 years; 2 of 18, and 2 of 19 years. 240 of these were boys, and 85 girls. From the above table we learn that the father's proportion of the total earnings is 75 per cent., the wife's less than 1 per cent., and the children's proportion 24 per cent. Children under 15 years of age supply from one-eighth to one-sixth of the total earnings, or about 15 per cent. of the earnings of the families to which they belong.

Out of the 397 families from which this information was obtained, 34 are in debt, 141 continue to make both ends meet, while 222, or 55 per cent. of the whole number, save money.

The following table would indicate that families earning less than $600 per year, *must necessarily get in debt;* and without children's assistance, other things remaining equal, the majority of families would be in poverty or debt.

The higher the income the greater the saving actually and proportionately.

The average saving is 3 per cent. of the earnings:

Number of Families.	Average Earnings.	Average Yearly surplus, or debt.
3	$300 to 400	— $33 10
7	400 " 500	— 8 43
48	500 " 600	— 5 13
92	600 " 700	9 86
110	700 " 800	20 25
71	800 " 900	32 48
38	900 " 1000	57 77
16	1000 " 1100	49 51
4	1100 " 1200	105 80
4	1200 " 1300	129 35
2	1300 " 1400	172 00
1	1500 " 1600	128 75
1	Above 1800	275 80
Total, 397		$24 72, Average.

We will now consider the items which enter into the "cost of living" as given in the first table.

	Average yearly rent.	Average yearly cost of fuel.	Yearly average for food.	Yearly average for clothing.	Sundry Expenses.
Occupations.					
Building Trades, skilled	$154 56	$45 19	$420 61	$114 67	$55 69
Boots, Shoes and Leather, skilled	140 92	45 74	411 65	97 45	44 51
Metal Workers, skilled	145 84	48 09	424 21	125 82	59 05
" " unskilled	121 47	37 48	413 77	85 14	39 59
Mill Operators, skilled	104 12	45 89	438 50	124 62	61 47
" " unskilled	81 67	40 66	421 73	85 18	36 71
" " overseers	145 50	53 50	469 12	217 25	142 15
Outdoor employments, unskilled	109 38	40 63	413 59	86 87	29 04
Shop trades, skilled	144 70	50 40	460 25	127 45	57 14
" " unskilled	98 80	37 56	410 96	69 36	26 39
Averages	$123 84	$43 91	$422 16	$113 38	$45 89
Kinds of Labor.					
Skilled	$140 55	$46 81	$427 31	$117 75	$55 72
Unskilled	103 30	40 16	414 93	85 32	31 72
Overseers	145 50	53 50	469 12	217 25	142 89
Averages	$123 84	$43 91	$422 16	$140 11	$45 89

Of the 397 families on whose reports these statistics are based, 4 were boarding, and only 4, or, say, *one per cent.*, owned their own houses. The houses averaged 4.79 rooms; and 288 out of 393, or 73 per cent., were reported "good"; 105, or 26 per cent., were from "fair" to "very bad." Nearly one-half of the unskilled laborers live in inferior tenements.

In the item of fuel we note, as an indication of the average quantity used, one out-door laborer used 2 tons of coal (at $9 50), $19; 1 cord of wood, $8; 1 cord of wood, $5 50; Total, $32 50. A skilled mechanic used 3 tons of coal (at $10), $30; 2 cords of wood (split), $22; 1 cord of wood (split), $8 50. Total, $60 50.

The yearly average for food ($422 16) is made up of $81 48 for meat, $9 68 for fish, $20 38 for milk, and $310 63 for groceries.

Under clothing, we have boots, $23 47; dry goods, $21 22; and clothing, $59 59.

From the above figures we learn that of the total expenditure of the 397 families, 58 per cent. were required for subsistence, 14 per cent. for clothing, 16 per cent. for rent, 6 per cent. for fuel, and 6 per cent. for sundry expenses.

A comparison of these results with the statistics of other countries shows that the working classes in Massachusetts, while better off than similar classes in other countries, are yet, in many cases, unable to make that provision for the time when their working powers have failed, that would seem to be a "natural and just expectation."

Probably the most valuable portion of this elaborate report is that devoted to the investigation of the "special effects of certain forms of employment upon female health," and especially on the health and development of young girls. This department was under the charge of Dr. AZEL AMES, Jr., and in calling attention to the great and irremediable ills that grow out of the too early labor of young girls, has struck at one of the roots of the most important questions of modern philanthropy.

It is true, women are seldom employed in any department of mining or metallurgy in this country; hence this question may appear as of less consequence to our readers, but there can be little difference of opinion as to the need of better and more useful education in the wives and daughters of our miners and other workmen. If our women were taught housekeeping, cooking, the making of clothes, &c., there is no doubt that they would make their homes far more attractive, and effect an immense saving in the use of the materials that make up the "cost of living." We believe that education should be made obligatory by every State, and the education of women in the duties which devolve on them in after-life, the care of a house, and the duties connected with it, and with the bringing up of children, are, at least, as important as the knowledge of reading and writing. This is a question that lies at the very foundation of the betterment of the laboring classes, and it is one that has never received its proper degree of attention.

There is another question, the employment of boys or men in unhealthy occupations, that will apply to a large class in our anthracite mines—namely, our "slate pickers," or "breaker boys." These boys, of very tender age, are kept for from eight to ten hours a day at work, often (where the coal is prepared dry) in a cloud of dust which makes the air almost irrespirable. Moreover, the occupation is one which requires the most constant, unremitting attention and vigilance; it is a constant strain on the mind, which, if long continued, would certainly be injurious to children of that age. Owing to the fact that our miners stand idle, from strikes or other cause, an average of three months in the year, the ill effects of this kind of labor are not noticed. When it becomes more generally known that the work of these boys can be replaced by machine work, at a great saving in the cost per ton of coal prepared, there is hope that before many years the occupation of the "slate picker" will be reckoned among tee things of the past.

The History of the Relative Values of Gold and Silver.

By R. W. RAYMOND.

Being a Portion of the President's Address before the American Institute of Mining Engineers at New Haven, February 23, 1875.

CONTINUED FROM PAGE 351.

TABLE III.—FROM THE DISCOVERY OF AMERICA TO THE OPENING OF THE MINES IN CALIFORNIA AND AUSTRALIA.

Date.	Ratio.	Authority.
A. D.		
1526	11.30	Apparent relation of market value, as deduced from the British mint regulations, some absurd and unsuccessful experiments in coinage being disregarded.
1543	11.10	
1561	11.70	French mint regulations.
1575	11.68	
1551	11.17	German Imperial mint regulations.
1559	11.44	
1604	12.10	British mint regulations—experiments disregarded.
1612	13.30	
1619	13.35	
1623	11.74	Upper German regulations.
1640	13.51	French mint regulations.
1665	15.10	
1667	14.15	Upper German regulations.
1669	15.11	
1670	14.50	British regulations.
1679	15.00	French regulations.
1680	15.40	
1687—1700	14.97	Ratios calculated from the bi-weekly quotations of the Hamburg prices current, giving the value of the gold ducats of Holland in silver thalers, down to 1771, and, after that, in fine silver bars. The nominal par of exchange during this period was 1:14.80; and the quotations show the variations of the market rate in percentage above or below this. At par, 6 silver marks banco were equivalent to one ducat $=68\frac{20}{47}$ ducats containing one mark (weight) of fine gold, and $27\frac{3}{4}$ silver marks banco containing one mark (weight) of fine silver. Hence, $6\times 68\frac{20}{47}\div 27\frac{3}{4}=14.80$, the par ratio.
1701—1720	15.21	
1721—1740	15.08	
1741—1790	14.74	
1791—1800	15.42	
1801—1810	15.61	
1811—1820	15.51	
1821—1830	15.80	
1831—1840	15.67	
1841—1850	15.83	

REMARKS.—The first part of this table, like those which precede it, is compiled from imperfect data, in the absence of such direct evidence of ruling market values as is furnished from 1687 to 1840 by the Hamburg quotations, the appearance of which is a significant indication of the extension of commerce and manufactures. All conclusions drawn from the mint regulations of countries maintaining a double standard are affected with a double uncertainty. In the first place, the frequent practice of enforcing, for reasons of state, arbitrary relations of value in coinage may mask the real market ratio; and, in the second place, the lack of free commerce and swift intercommunication among the nations may retard the evils resulting from such arbitrary action, and postpone the necessity of legislative remedy. Hence the change, as shown by the mint-regulations, may apparently occur some time after the real change in the relative value of the metals. Certain wild experiments with the coinage, particularly in England, have been omitted from the table, as having no real connection with the actual relative value. But if we do not scan the dates too closely, nor lay too much significance upon the maintainance of a certain rate in one country after it had been abandoned in another, the figures above given, down to 1680, may furnish us an instructive picture of the effect of the discovery, conquest and plunder of South America upon the commercial relations of Europe.

The earliest effect of this discovery was the shipment of gold to Spain, during the first quarter of the 16th century. At the beginning of that century, as shown in Table II., the ratio of silver to gold was about 1:10.7 or 1:10.5. The average annual influx of gold to Spain, down to 1527, probably did not exceed $400,000. But this supply, though it seems small to us now, would doubtless have depressed still further the value of gold, but for the remarkable productiveness of the Bohemian and Saxon silver mines. The joint result of both causes was a notable increase of the amount of precious metals in circulation, and hence a rise in general prices, with which we have here nothing to do. The effect on the ratio between gold and silver was a gradual increase in the value of gold.

About 1550, the annual supply of gold may be roughly estimated to have been $400,000, and that of silver $2,600,000. By 1600, the production had become about $1,200,000 gold and $10,000,000 silver; in 1650, about $2,300,000 gold and $15,000,000 silver. This increase in the supply of gold is largely due to the development of the Guinea Coast, and the productiveness of the Hungarian gold mines. The increase in the supply of silver is due to the introduction of

amalgamation, and its use, principally in the form of the patio process, for the cheap production of silver in Peru and Mexico.

It is scarcely necessary to point out that the relative value of the two metals is not in the simple inverse ratio of their supply. The question of cost of production and of superiority in qualities adapting them for different purposes of currency, exportation, ornament and manufacture, must always play an important part; and even after all these elements have been calculated, it would be difficult to fix or foretell the relative price of the metals, since the local, temporary and fluctuating demands and so-called "movements of specie" come in as disturbing phenomena of that incalculable element, the human will.

Thus we find that in the latter half of the sixteenth, and the first half of the seventeenth century the production of silver was about seven times as great as that of gold. The drain of silver to the East Indies had already begun, and a large part of the product of South America found its way thither, returning in varied forms of wealth and luxury to enrich and enervate the Mediterranean nations. Yet the remainder of the silver product was great enough to cause an increasing surplus of that metal, and a consequent fall in its relative price. It was, moreover, in many countries a period of war, and the large expenditures incurred led to a general increase in the gold coinage. The sudden and violent changes shown by some of the continental mint regulations are indicative rather of financial and legislative necessities than of commercial changes. The English regulations seem to have been, on the whole, more stable, and represent probably with greater accuracy the steady enhancement of gold, the value of which, as compared with silver, advanced during the seventeenth century about 30 per cent., and during the sixteenth and seventeenth centuries together, about 45 per cent.

A general tendency in the same direction is visible in the eighteenth century; but here there is much greater stability, and the rise of gold is frequently checked.

Aided by the exact data drawn from the Hamburg quotations, we can trace the causes of fluctuation more accurately than in former years. I repeat that we are not here concerned with the general rise in prices, produced by the greater volume of metallic currency and the multiplication of its efficiency through banking and credit. Our object is to study simply the agencies at work upon the relative value of the metals; and we find in this period, as in former ones, counteracting causes with a general resultant effect. The influx of silver from South America to Europe was continued and increased down to the beginning of the nineteenth century; but the export to Asia of piastres, coined from American silver, assumed colossal proportions, averaging, as Prof. SOETBEER estimates, from 1690 to 1800, about $6,000,000 annually. Moreover, there was a considerable importation of gold from Asia, in return, to Spain and England. In China and Japan, according to the celebrated report of Sir ISAAC NEWTON, Master of the British Mint, in 1717, the pound of fine gold was worth but nine to ten pounds of fine silver, while the ratio in Europe was about 1:15. A merchant buying his goods in India with silver, and selling them in Europe for silver, or for gold, with which he purchased silver again for a new venture, would gain 50 per cent. in exchange alone, besides the fair profit of the trade; and, of course, it would be worth while for him, after completing in the East his cargo of bulkier products, to lay out the remainder of his cash capital in the purchase of gold, which could be easily stowed and transported. This explains why, in the piracy and naval warfare of those times, the East Indiamen, going or coming, were considered so desirable as prizes. In either case, they were tolerably certain to carry rich booty of silver or of gold.

But besides the export of silver to India, and the imports of gold from India, there was, for a short period, a notable influx of gold from America—principally from New Granada and Brazil. The Brazilian supply was greatest from 1749 to 1761; and at that period occurred the unusual phenomenon of a rise of more than 4 per cent. in the relative value of silver, due to this cause. From 1701 to 1748, the average ratio was 1:15.19; from 1751 to 1755, it was but 1:14 53. This reaction, on the other hand, was checked by the demand for gold in the United Kingdom for the purpose of coinage, and for the payment of heavy war subsidies to the continental nations, during the struggle with Napoleon. The Bank of England, it is true, suspended specie payments from 1797 to 1819; and during this period the circulation of gold in Great Britain was reduced; but the subsidies and hoarding kept up its price; and the resumption of specie payments caused a sharp rise, so that the average ratio for 1821 was 1:15.95. The contemporaneous falling off in the supply from America, Africa and India, would doubtles have carried this movement still further, but for the unexpected development of a new source of production in Siberia and the Ural. In the absence of the political and commercial causes already enumerated as operating to enhance gold, this sudden influx of it would have mightily diminished its price. In fact, however, the ratio of value was not essentially changed, though the proportion of production was for the time being revolutionized. At the end of the eighteenth century, the whole annual product was estimated at about $15,000,000 gold and $40,000,000 silver. In 1846, on the other hand, by reason of the supply from Russia, the gold product was estimated at about $43,000,000 gold, while the silver had not increased—had, in fact, slightly fallen off. At the beginning of the nineteenth century, in other words, the production of the precious metals was about 27.8 per cent. gold, and 72.2 per cent. silver. By 1846 it had become about 52.3 per cent. of gold to 47.7 of silver. Yet the relations of value had changed. The average of 1846 shows a ratio of 1:15.66.

From 1841 to the present time the relative values are calculated from the London quotations, as explained fully below.

TO BE CONTINUED.

Influence of Silicon, Sulphur, Phosphorus, and Manganese on the Qualities of Iron.

By RICHARD AKERMAN, of the Stockholm School of Mines.

CONTINUED FROM PAGE 352.

IT is, in fact, just by means of fluxes rich in lime, and a high temperature in the furnace, that the purification of iron from sulphur is for the most part effected, for it is only at Swedish furnaces that roasting is carried on in such a way that a considerable amount of sulphur existing in the ore is almost completely driven out before the ore is placed in the furnace. With coke and coal furnaces the cost of a careful roasting would scarcely pay itself, because in every case so much sulphur is found in the fuel itself; and when to this is added the fact that calcareous ores, even with the most careful roasting, cannot be freed from all their sulphur, it is not difficult to see that in many cases there is no choice but to leave the removal of the sulphur to the furnace itself. This is brought about, as has been said, by large additions of lime and a high temperature in the furnace, and how effectually iron may be purified from sulphur in this way appears best from the fact that a content of sulphur of 1 to 1·5 per cent. is very common in furnace slag obtained by the use of fossil fuel.

To show by an example how large quantities of sulphur have often to be dealt with in coke furnaces, the following figures grounded on the accurate researches of BELL (1) may be stated. In the charge of a furnace in the Cleveland District he found the percentages of sulphur to be in the roasted Cleveland ore, 1·052 per cent.; in the lime, 0·059 per cent.; in the coke, 1·580 per cent.; and the products obtained therefrom contained, the pig iron, 0·093 per cent. sulphur, and the slag, 2·633 per cent. sulphur. For 1 cwt. pig iron were used about 2·40 cwt. roasted ore, 0·6 cwt. lime, and 1·20 cwt. coke; and for 1 cwt. pig iron there were about 1.5 cwt slag. For every cwt. of pig iron produced there were thus put into the furnace—

In the ore	2·40×1·052=2·525	lb. sulphur.
In the lime	0·60×0·059=0·035	" "
In the coke	1·20×1·580=1·896	" "
Total	4·456	" "

For every cwt. of pig iron produced there were removed from the furnace—

In the pig iron	1·00×0·093=0·093	lb. sulphur.
In the slag	1·50×2·633=3·950	" "
Total	4·043	" "

The remaining 0·413 lb. sulphur had escaped in the form of gas or some other way.

Finally, as a remarkable proof of the large quantity of sulphur that may be removed in furnace slag, the following analysis of pig iron and slag belonging to it, from Waldenburg, made by R. RICHTER (2), may be quoted—

The pig iron contained	Carbon	4·021	per cent.
" "	Silicon	0·961	"
" "	Phosphorus	0·246	"
" "	Sulphur	0·079	"
" "	Manganese	0·791	"
" "	Iron	93·631	"
Total		99·729	"

			Containing oxygen.	
The Slag—	Silicic acid	33·18 per cent.	—	15·49
"	Alumina	13·28 "	—	6·21
"	Lime	42.53 "	12·15	
"	Magnesia	5·93 "	2·37	
"	Oxide of manganese	0·04 "	0·01	
"	Oxide of iron	0·22 "	0·05	14·58
"	Sulphide of calcium	5·90 "	contains sulphur 2·62	
Total		101·08 "		

The Action of Nitrates on Sulphide of Iron.—Alkaline nitrates have, as is well known, an oxidising action on compounds of sulphur, when mixed with them, and heated to a sufficient extent, bringing about the formation of an alkaline sulphate. It is, therefore, natural that an iron containing sulphur must be freed from a portion of it if carbon is not present, and the iron, in a fused state, is brought into sufficiently intimate contact with an alkaline nitrate. For this purpose the nitrate must, however, as is the case with HEATON'S process, so to speak, work from below, for if cast in a bath of fused iron, it is decomposed by the heat without the oxidising gases thus set at liberty being able to exert any considerable action on the iron.

The slag obtained by the action of an alkaline nitrate on fused pig iron containing sulphur in HEATON'S process contains, according to GRUNER (3) both an alkaline sulphate and sulphide of sodium, the latter of which, it is thought, must have been produced through the reducing influence of carbon combined with the iron.

The Action on Sulphide of Iron of Peroxide of Iron and Sulphate of Peroxide of Iron.—Protosulphide of iron and protoxide of iron do not decompose each other, but on the contrary, they can, according to BERTHIER (4) be fused together, when sufficiently heated, in any proportions whatever, wherefore also the refining slags containing black oxide of iron obtained during the refining of pig iron containing sulphur, when sprinkled with sulphuric acid, give off sulphuretted hydrogen. In full correspondence with the facts just mentioned, metallic iron cannot be obtained by heating protosulphide of iron in mixture with peroxide of iron, but in proportion as the quantity of peroxide of iron is increased, the sulphide of iron is, according to PERCY, (5) the more completely oxidized, black oxide of iron and sulphurous acid being formed, the latter of which escapes; and if so much peroxide of iron is mixed with the protosulphide that there are 200 parts by weight of the former to eleven of the latter, there remains, after heating, only black oxide of iron, inasmuch as all the sulphur has escaped as sulphurous acid, according to the formula $Fe\,S + 10\,Fe^2\,O^3 = 7\,Fe^3\,O^4 + SO^2$.

In the same way, too, can sulphur be removed as sulphurous acid from sulphide of iron by mixing it with a sulphate of iron, and if the proportions of these substances are properly adjusted a residue is obtained completely free from sulphur, according to BERTHIER (6).

(1) The Journal of the Iron and Steel Institute, 1871, vol. II., p. 283.
(2) Dingler's Journal. Bd. 195, p. 73.
(3) "Annales des Mines," 6 ième Serie, T. XVI., p. 217 and 248.
(4) "Traité des essais par la voie sèche," T. II., p. 129.
(5) "Metallurgy; Iron and Steel," p. 35. Percy-Wedding, Abth, I., p. 44.
(6) "Traité des essais par la voie sèche, T. II., p. 193.

The Action of Oxide of Lead on Sulphide of Iron.—Sulphide of iron, according to BERTHIER (7) combines with oxide of lead when added in small quantities; but if this substance is mixed with it in excessive proportion (thirty times the weight of the protosulphide of iron) the whole of the sulphur is removed as sulphurous acid, while the iron is oxidized to protoxide of iron.

This circumstance R. RICHTER thought to turn to account in practice, by adding litharge to pig iron rich in sulphur, when it is puddled, but the result does not appear to have answered the expectations to which the first experiment is thought to have given rise (8), for as far as I am aware, this method has not come into use.

THE REMOVAL OF SULPHUR FROM SULPHATE OF IRON.

By heating sulphate of iron to a red heat, the half of its sulphur can be removed by a part of the sulphuric acid giving up an equivalent of oxygen to oxidize the protoxide of iron to peroxide, and being thereby itself reduced to sulphurous acid which escapes; $2\ FeO\ SO^3 = Fe^2\ O^3\ SO^3 + SO^2$ (9). If, again, the sulphate of iron is mixed with charcoal powder, the whole of the sulphur, according to GAY-LUSSAC(10), can be removed as sulphurous acid, the sulphuric acid being reduced by the charcoal to sulphurous acid which escapes, carbonic acid being formed at the same time.

The former of these reactions goes on in all cases of roasting, and the latter also, probably, does so to some extent, when the ore when roasted is mixed with charcoal. If this is the case, more sulphur will be removed as sulphurous acid when the ore undergoes calcination in mixture with charcoal than when no charcoal is present, in which case a larger portion of the sulphur remains as sulphuric acid till the temperature is raised so much, that even it is driven out of its combination with the oxide of iron which has been formed.

The reaction in question—or the removal of the sulphur as sulphurous acid—may possibly also take place in the blast-furnace, when, in consequence of incomplete roasting, sulphates of iron are found in the ores; and it appears not improbable that this circumstance affords the right explanation of the observation made by E. WESTMAN and others, that the more powerful the action of the blast-furnace is, the larger is the proportion of the sulphur in the charge which passes into the pig iron. That the sulphur may be driven out of the furnace in this way, great caution is required, for a hasty heating must, when carbon is present, bring about a more complete reduction of the sulphates to sulphuret of iron. A powerful action in the furnace does not, however, always appear to cause the production of a pig iron richer in sulphur than usual, and it may perhaps be taken for granted that no considerable amount of sulphur can be driven off either in this way or by the action of oxide of iron upon sulphuret of iron in the furnace, for the analysis of furnace gases does not show that they contain any quantity of sulphurous acid; and if it is true that few researches of this kind have hitherto been undertaken, the sulphurous acid, in any case, if a noticeable amount of it is to be found in those gases, must have made itself known by its easily-distinguishable odor, which, however, as far as I am aware, has nowhere been the case.

THE RECIPROCAL ACTION OF SULPHUR AND CARBON IN IRON.

The Action of Sulphur on Iron rich in Carbon.—With regard to the mutual action of carbon and sulphur, it is believed to be demonstrated that, when sulphur is present to that amount that the iron can form with it proto-sulphide of iron, the sulphur drives the carbon out of the iron, and that so completely that it cannot remain as graphite mixed in its mass, but is separated on its surface. KARSTEN (11), for instance, has shown that if iron, completely saturated with carbon (spiegeleisen) and sulphur are fused together in a closed crucible, the carbon is separated and deposited as a lusterless soot upon the surface of the sulphide of iron that has been formed.

If the sulphur employed is not sufficient to saturate all the spiegeleisen, the remainder of the iron which is not saturated, being already saturated with carbon, cannot, in that case, take up any of the carbon driven out by the sulphur; but when, in another experiment, gray pig iron not saturated with carbon, after being fused, was run over a quantity of sulphur insufficient fully to saturate all the iron with sulphur, the sulphide of iron that was formed floated up in consequence of its lower specific gravity, and could be poured off from the iron that was to be found under it, which, after cooling, had the appearance of spiegeleisen. The gray pig iron used for this experiment contained 0·62 per cent. combined carbon and 3·31 per cent. graphite, or, together, 3·93 per cent. carbon, with 0·029 per cent. of sulphur. The spiegeleisen formed from it contained 5·49 per cent. combined carbon, and 0·45 per cent. sulphur.

It will shortly be seen that sulphur in a high degree increases the power of iron to retain the carbon existing in it in the combined state, and it is therefore not wonderful that spiegeleisen should be easily formed under such circumstances as those last described; but there is, however, no absolute necessity that that part of the carbon which has been driven out of the iron now combined with sulphur, which is taken up by the iron not saturated with sulphur, must exist therein after cooling in the combined state, or in other words, that white iron must in this case necessarily be formed, for on the other hand KARSTEN, in a third experiment of the same kind, in fact, obtained not spiegeleisen, but gray pig iron. In this experiment gray pig iron, with 0·59 per cent. combined and 3·27 per cent. uncombined carbon, or together 3·86 per cent., in a strongly heated state, was run over sulphur, whereby was obtained, besides sulphide of iron, a new gray pig iron richer in carbon, which had 1·11 per cent. combined carbon and 4·51 per cent. graphite, or in all 5 62 per cent. carbon. Its content of sulphur is unfortunately not stated, wherefore it is impossible to conclude whether the smallness of the content of sulphur, or a higher degree of heat, was the true cause of this pig iron being gray, when that in the former experiment, on the contrary, was white.

From these experiments it appears:—

(1) That the carbon is completely driven out of iron which becomes saturated with sulphur.

(2) That iron to some extent saturated with sulphur does not unite with iron rich in carbon, as sulphide of iron on the contrary does with iron poor in carbon (malleable iron), inasmuch as they can be fused together to a homogeneous mixture in any proportions whatever (12), and

(3) That the carbon driven out by the formation of sulphide of iron is taken up by the rest of the iron which is not saturated with sulphur, till the content of carbon therein has reached the limit beyond which no more carbon can be taken up by iron, and that first when this maximum has been arrived at, the carbon occurring in excess is separated, and rises to the surface in the form of graphite.

(7) "Traité des essais par la voie sèche." T. II., p. 191.
(8) Dingler's Journal, Bd. 161, p. 155.
(9) Plattner, "Die metallurgischen Röstprocesse," p. 133.
(10) "Annales de Chemie et de Phisique," T. 63, p. 434.
(11) Eisenhüttenkunde, 3te Ausg, T. 1. p. 426.
(12) Percy, "Metallurgy; Iron and Steel," p. 33. Percy-Wedding, Eisenhüttenkunde, Abth. I., p. 172.

Several experiments made in PERCY'S laboratory (13) in which gray pig iron was fused with 2 to 17 per cent. sulphide of iron in well-closed clay crucibles, both without addition of other substances, and with a covering of mirror glass added in the form of powder, are believed finally to show that even smaller quantities of sulphur drive carbon out of pig iron to some extent, for in all the cases where the fusion took place with addition of glass, there was always found between the metallic regulus and the glass or slag more or less of a soot or graphite-like substance. This is further strengthened by the estimations of carbon which were made when the fusion had taken place without any addition of glass, for these showed that the pig iron's content of carbon was always somewhat diminished by fusion with sulphide of iron. The most remarkable results of the last-named experiments were the two following:—

The gray pig iron and the sulphide of iron together contained:				Loss during fusion.		Nature of the pig iron after fusion.
Before being fused together.		After being fused together.				
Carbon.	Sulphur.	Carbon.	Sulphur.	Carbon.	Sulphur.	
Per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	
3·841	4·378	3·170	2·120	0·671	2·258	White without graphite.
4·164	2·235	3·900	1·680	0·264	0·555	White, but containing graphite.

A somewhat larger quantity of Sulphur-saturated Iron does not, when fused, mix properly with Iron rich in Carbon.—KARSTEN'S experiments, just referred to, show that a mixture of sulphur-saturated and carbon-saturated iron, when fused, does not enter into any complete union, but the action resulting from such a fusion is limited to this, that the pig-iron only takes up a portion of sulphur, while the excess of the sulphide of iron deposits itself in a separate layer on the top of the pig iron. This BERTHIER (14) has also found to be the case, and he states, in addition, that if the temperature has not been too high, small crystals of protosulphide of iron are almost always to be found in the pig iron.

That the pig iron takes up in a very incomplete degree even comparatively small quantities of sulphide of iron is confirmed by PERCY'S (15) experiments, quoted above; for when the pig iron was fused with only 3 per cent. sulphide of iron, under a covering of glass, the graphite-like mass obtained along with the metallic regulus showed itself to be very rich in sulphur.

The facts now stated, viewed in conjunction with each other, render it probable that the sulphur contained in pig iron is not always quite equally distributed, and that it is by no means impossible to find in it occasionally a little sprinkling of protosulphide of iron. This hypothesis, however, would not have been worth mentioning if it were not in some measure corroborated by the researches of SNELUS, of which an account has already been given, whence it appears that the lighter and finer pig iron borings were much richer in sulphur than the others.

The action of Carbon upon Sulphuret of Iron.—We have already seen that an iron containing carbon loses it when it enters into combination with as much sulphur as the iron at the high temperature employed has power to take up, but the question now is whether carbon possibly has a corresponding power of driving sulphur out of a sulphuret of iron mixed with it, and forming pig-iron.

This certainly does not take place in any very great degree; but in the same way that a small quantity of sulphur appears, as we have seen, to have the power to drive a little carbon out of pig iron, so, also, on the other hand, according to BERTHIER and PERCY (16) a little sulphur can, through very strong heating, be driven out of a mixture of sulphide of iron and charcoal. If finely pulverised sulphide of iron is mixed with charcoal powder there are obtained, after the necessary heating, small buttons of metal equally distributed through the charcoal powder, and if these are collected and fused in a charcoal crucible there are obtained below the sulphide of iron one or several buttons of pig iron rich in sulphur (17). Likewise, the sulphur contained in an iron is diminished to some extent if it is fused at a high temperature with charcoal free from sulphur (18), and when the iron containing sulphur itself contains carbon there is no necessity for making any separate addition of carbon; but the quantity of sulphur is diminished, as appears among others from PERCY'S above-quoted experiment, solely by fusing together both the iron containing sulphur and that containing carbon in a well-closed clay crucible.

We must now inquire in what form or combination the sulphur is removed in this case. Bisulphide of carbon is formed, as we know, from sulphur and carbon when strongly heated, and in full correspondence herewith it is also obtained by strongly heating iron pyrites and charcoal, the former, as we have seen, giving up, when heated, half of its sulphur. It is supposed, therefore, that we would not be far from the truth to suppose with BERTHIER that bisulphide of carbon is also formed when protosulphide of iron is heated in mixture with charcoal; but, however probable this may appear to be, it has not hitherto been possible to adduce any certain proof that such a formation of bisulphide of carbon takes place under the circumstances referred to. As far as I am aware there has also been no attempt to collect the gases which possibly are given off when a pig iron rich in carbon is fused together with sulphide of iron.

If we may assume that pig iron sometimes contains sulphide of iron mechanically incorporated, a reason for the diminution of the content of sulphur by fusion may also be found in the circumstance that a part of the sulphur-saturated iron rises to the surface when fusion takes place and passes into the slag.

Sulphur increases the power of Iron when cooling to retain the Carbon occurring in it in the combined form.—From PERCY'S experiments, which have been so often referred to, it appears evident that sulphur combined with pig iron disposes it to be white, or that it increases the power of iron to retain the carbon occuring in it in a state of combination, for when he fused sulphide of iron together with gray pig iron there was obtained in nearly all the experiments a white pig iron, although the temperature employed at the fusion was very high; but when he fused the pig iron in the same way, but without addition of the sulphide of iron, it became dark grey. PERCY even thinks that his experiments show that it is impossible to find graphite in a pig iron with 2·25 per cent. sulphur (19).

The action of sulphur upon pig iron is not, besides, an altogether new discov-

(13) "Metallurgy; Iron and Steel," p. 133. Percy-Wedding, Eisenhüttenkunde, Abth. I., p. 172.
(14) "Traité des essais par la voie sèche," T. II., p. 191.
(15) "Metallurgy; Iron and Steel," p. 134. Percy-Wedding, p. 174.
(16) Traité des essais par la voie sèche," T. I., p. 487, T. II., p. 191.
(17) "Metallurgy; Iron and Steel," p. 34. Percy-Wedding, Eisenhüttenkunde, p. 43.
(18) "Metallurgy; Iron and Steel," p. 134. Percy-Wedding, Eisenhüttenkunde, p. 173.
(19) "Metallurgy; Iron and Steel," p. 136. Percy-Wedding, p. 177.

ery, but it has in fact been already known of old, through experience on the large scale, that the more sulphur a pig iron contains, the greater difficulty there is in getting it gray, and that furnace-charges comparatively rich in sulphur therefore readily yield white pig iron. How powerful the influence of sulphur in this respect is, is seen best from the fact that at furnaces where fossil fuel—which always contains sulphur—is used, the charge is generally made more basic in the same proportion as the pig iron is wished to be more dark gray or rich in graphite, while here in Sweden, with our comparatively sulphur-free charges, we proceed after a quite opposite method, inasmuch as we make the charges richer in silica for the production of gray cast iron, than for that of "mottled" pig iron from which malleable iron is to be made,

The reason for our proceeding thus is that, *cæteris paribus*, the more rich in silica a charge is kept, the more silicon is reduced and taken up by the iron, but the richer in silicon the pig iron is, the more readily does it become gray, the silicon, as we have already seen, diminishing the power of iron to retain carbon in combination. The more basic the charge is kept the less silicon is reduced, and as, notwithstanding this, a gray pig iron is obtained from charges rich in sulphur the more readily in the same proportion that more lime is added, the conclusion may be drawn from this, that the sulphur must give the pig iron the propensity to become white. The immediate consequence of the increased addition of lime is not only a diminished content of silicon, which by itself facilitates the production of white pig iron, but, also, a smaller content of sulphur must be the cause of the pig iron, notwithstanding its diminished content of silicon, being grey. The power of iron to retain in combination the carbon occurring in it appears thus to be more increased by sulphur than it is counteracted by silicon.

Does Sulphur Counteract the Power of Iron to take up Carbon?—To the state of things just described, the circumstance may also, perhaps, in some degree conduce that the pig iron's total content of carbon is possibly somewhat increased by the charge being kept more basic. It has already been stated that reason is at least not altogether wanting for the supposition that silicon not only favors the separation of carbon as graphite, but also, in some degree, diminishes the disposition of iron to take up carbon, and it may also be a question if sulphur possibly does not operate in the same way as silicon in the last-mentioned respect, although it, in opposition to silicon, at the same time increases the power of iron to retain in combination the carbon once taken up.

We are, however, clearly not entitled to come to a conclusion about the operation of sulphur upon iron now in question, from KARSTEN'S experiments, already described, as several metallurgists have done. At the same time that these experiments show that the carbon is driven out when the iron is completely saturated with sulphur, they also, indeed, make it evident that iron containing much sulphur has power to take up a very considerable quantity of carbon, for the pig iron added in excess increased its content of carbon up to 5·49 per cent., although it contained 0·45 per cent. of sulphur, a particularly large amount for a pig iron. On the other hand, PERCY'S often-quoted experiments, which show that even lesser quantities of sulphur, when fused with iron, drive out some carbon, seem to prove that sulphur in some degree lessens the power of the fused iron to take up carbon.

In connection with this it perhaps ought to be pointed out that the Swedish cannon pig-iron, which has a greater content of sulphur (0·1 to 0·14 per cent.) than other Swedish pig, contains comparatively somewhat less carbon—for its total content of carbon is not generally more than 3 to 3·6 per cent., while Swedish pig commonly contains about 4 and not unfrequently 4·5 per cent. carbon; but it is not, therefore, to be altogether taken for granted that the cause of the cannon pig-iron's lesser content of carbon is to be sought for in its larger content of sulphur; but this result may also follow from the difficulty of reducing the ores employed for this purpose, for if they are, in fact, difficult of reduction, a lesser content of carbon in the pig iron must thereby be occasioned.

TO BE CONTINUED.

Notes.

The First Zinc Furnace erected in Silesia was at Wessola in 1798 by JOHANN CHRISTIAN RUBERG; Gas furnaces were introduced there by MENZEL (without success), in 1849. HENRY SIEMENS introduced his regenerative furnaces in 1868.

Cast-iron Pipes with Cement Lining.—Such pipe is strongly recommended for use in mines where the water contains acid. The pipes must be cleaned from rust, and the cement mixed to a thin paste without sand and poured in.

Production of Coal in British Columbia.—During the year 1874, 81,397 tons of coal were shipped from British Columbia; of these shipments 51,197 tons went from the Vancouver Coal Company's mine, and 3[illegible],200 from the Wellington Mine.

Soldering without Heat.—Take ½ oz. fluoric acid, 2 ozs. brass filings, and 1 oz. of steel filings. Put the filings into the acid, and apply the solution to the parts to be soldered, which dress together. *Note.* Take care to keep the fluoric acid in an *earthen* vessel.

Fat Lute.—(1) Mix dry clay in powder with drying oil until made into a thick paste. The part to which this is to be applied must be dry and clean. (2) Mix plaster of Paris with water, milk, or weak glue. Both of these lutes will stand a dull red heat.

Fire Lute.—(1) Mix thoroughly 2 parts good clay, 8 parts sharp washed sand, and 1 part short straw or horse manure. Temper like mortar. (2) Mix linseed or almond meal to a paste with milk, lime-water, or starch paste. This, it is said, will make a lute that will stand to 500 deg.

Purifying Metal.—M. GARNIER recommends the use of chloride of silicium, with or without chlorine, for the purification of the melted iron in Bessemer converters, or furnaces with fixed or revolving soles. The chlorides are obtained from natural hydrated silicates, or from forge scoria.

Glasswool.—Glass drawn out as fine as the finest wool or silk may be used with advantage for filtering in certain cases. That exhibited at the Vienna Exposition was manufactured in Bohemia; but it is now also manufactured in Thüringen, of excellent quality and for about $1.75 per ounce.

Evaporation of Water in Gas Meters.—Dr. REDNER calculates that for every cubic meter of gas recorded as having passed through a wet gas meter, twenty-three litres of aqueous vapor, or 2.3 per cent., by volume, of the gas so recorded, is aqueous vapor taken up by the passage of the gas through the water.—*Zeitschrift des Vereins Deutscher Ingenieure.*

Examination of Nitro-glycerin.—Results of a number of nitrogen determinations, according to the various methods of Dumas, Siewert, and Schulze, seem to show that nitro-glycerin never consists of the tri-nitro compound alone, the amount of nitrogen being always 2-4.5 per cent. less than is required for the formula of that compound.

Hydrogenized Iron.—MM. TROOST and HAUTEFEUILLE, of the Ecole Normale, who are studying the combinations of hydrogen with the metals, have observed that the gas exists in ordinary pig iron to the extent af twelve volumes, and in manganese pig to the extent of twenty-seven volumes. Mr. DEVILLE attributes the production of sparks from molten iron to the jets of gas.

Bessemerizing with Hot-blast.—F. REISER—The attempt was successfully made at the Zeltwig Bessemer works, during the summer of 1874, to convert mottled iron with a blast heated to 700 deg. C. Two practical difficulties caused a suspension of the experiment; one, the rapid destruction of the converter bottoms, the other, that those parts of the converter in contact with the blast became so heated as only to be handled with great difficulty.—*Revue Universelle.*

Black Stencil Ink.—Take of shellac 2 parts; borax, 1 part; soft water 10 parts, and gum arabic, 1 part. Then add lampblack and indigo in sufficient quantity. Boil the shellac and borax in the water until dissolved, then add the gum, and withdraw the mixture from the fire. When, cold add the lampblack, to bring it to a suitable colour, and lastly a very small quantity of finely-powdered indigo to give it a real "jet" shade. When made, keep in glass or earthenware vessels.

Neogene.—The name "neogene" is given by M. SAUVAGE to a new white alloy composed of copper, 57 parts; zinc, 27 parts; nickel, 12 parts; tin, 2 parts; aluminum, 0.5 part; and bismuth, 0.5 part. It has a silvery appearance, is sonorous, tenacious, malleable, and ductile, and is recommended for jewellery, as a substitute for silver in plate, and for low coinage. The new elements in the combination are those of the bismuth and alluminum. The alloy is very homogeneous, and is susceptible of a high polish.

The Przibram (Bohemia) lead and silver smelting works.—G. J. PILZ.—Ores containing 50 p. c. Pb. are roasted in sinter-roasting reverberatories until they contain but 2-3 p. c. S. They are then treated in round Pilz shaft furnaces, having five and seven tuyeres, and an automatic siphon-tap; the fuel used being two-thirds charcoal and one-third coke—the latter of inferior quality. It is proposed to heat the blast. The lead obtained is cupelled in German cupelling-hearths with condensation chambers. These works may be considered a type of the most improved ones now in Austria.—*Berg- und Hüttenmännische Zeitung.*

Phosphorus Steel.—A. GREINER describes the methods employed for steels of this class, manufactured at Zwickau (Saxony) and Schwandorf (Bavaria). The pig irons used for this purpose, at the former locality, contain 0·10 to 0.12 per cent. P, and 2·60-4·00 per cent. Mn; and at the latter, a minimum of 0·10 per cent. P, and about 4 per cent. Mn. The steels made contain 0·185 per cent. P, and the Mn not determined. The only use to which these steels are put is as heads of rails, using fibrous iron for the web and base, granular iron, containing phosphorus, being placed between the steel and fibrous iron.—*Revue Universelle des Mines.*

Wages in Australia.—The demand for labor in all the principal trades of the Australian labor market was not nearly so great during the month of February as it has been for many months past. In the engine-fitting shops there is a fair supply of workmen; the wages are from 11s. to 12s. per day. The same rates are paid in the fine brass-finishing shops, but the supply of workmen is very limited, and good tradesmen are much wanted. Boiler-makers, smiths, fitters and turners receive 10s. to 12s. per day; laborers from 6s. to 7s. The average rate for miners in the Ballarat district is £2 5s. per week, eight-hour shifts; breaksmen get a slightly higher rate of wages. In Bendigo district, quartz miners, in deep sinking, for pit work, get £2 10s.; ordinary quartz miners get £2 5s. per week; engineers receive £3 to £3 10s. In Bendigo most of the work is done on tribute. In Alexandra, Maryborough and Daylesford, miners recieve £2 10s. per week. Most of the work in Gibbs Land is done by contract; where wages are paid the men receive from £2 10s. to £3. The rate paid the navvies employed on the Government railways is 9d per hour. Plumbers and gas fitters receive £3 per week of eight hours per day. The trade of the tinsmiths is very brisk at present, and the meat preserving companies being at work again, workmen are in good demand. Tinsmiths earn from £2 to £3 per week; ironworkers £2 10s. to £3 per week; galvanizers can earn £3 per week. Most of the work in this trade is done by the piece.

Cork as a Non-Conductor of Heat.—Our contemporary, *La Métallurgie*, after referring to a previous article as to the formation of a "limited" company in Paris for the purpose of turning to account the non-conducting properties possessed in a remarkable degree by cork, proceeds to say:—The company had already given specimens of its work, and had applied it to the steam pipes of several important works; but the stamp of experience was wanting. It may now, however, be stated as a fact that, after standing eighteen months, the cork cleading has remained intact, and is as perfect a non-conductor as on the day it was laid. Although the durability of this substance had been proved before by the buoys, which are partly immersed and partly exposed to the weather, its being able to stand such high temperatures as those of surfaces heated by steam at from 7 to 8 atmospheres had not hitherto been shown. Now, felt, which is a good non-conductor of heat when first laid, deteriorates very rapidly; although retaining its original appearance, it ceases to be effective after a few weeks, and ultimately tumbles into dust. A fear of the same result occurring in the case of cork would, no doubt, be entertained by those who are unacquainted with its nature, but not by those who know the composition of this remarkable wood-like substance. To set all misgivings at rest, however, nothing is so satisfactory as actual experience, and there is no doubt that cork is now firmly established as *the* non-conductor *par excellence*. Its lightness, the readiness with which it yields so as to surround the cylinders or pipes it may be destined to encase, the facility with which it is put in its place, taken down and put up again in the case of an inspection or repairs to a boiler or steam-pipe, and above all, its non-conducting power, effecting so great a saving of fuel, assure for it the highest place in the eyes of all manufacturers who regard their own interests. The engineers of the French Navy have made experiments on cork employed as a non-conductor, and have reported thereon to the Admiralty (French), which body has requested the manager of the company to appoint, at the five military ports, agents charged with attending to any orders which may be given. This *cachet*, given by men so reserved as the French naval engineers, at once places cork in the first rank as a non-conducting substance.

The Mines of the Clearfield Region, Pa.—The following table gives the names and estimated capacity of the mines, and the number now working, in the Clearfield Region, Penna., where the men are now on strike; they were asking 60 cents per ton, or an increase of 10 cents, which the employers refuse.

	Eastimated Capacity.	Now working.
	Tons per day.	
Morrisdale—R. B Wigton & Co.	500	About half capacity.
Powelton—R. H. Powell & Co.	350	" " "
Moshannon Coal Co.	300	Idle.
Stirling Collieries	600	Full, under police protection.
Eureka—Berwind, White & Co.	500	Idle.
Franklin Coal Co.	600	About one-sixth.
Webster Colliery—Thomas & Co.	400	Idle.
Dr. Mears' Colliery	50	"
Whitehead & Co.	400	"
Fisher Bros. & Miller	300	"
Mead Coal Co.	200	"
Mapleton—Berwind, White & Co.	400	"
Logan Coal Co.	300	"
Laurel Run Coal Co.	400	"
Decatur Coal Co.	200	"
Derby Coal Co.	200	"
Union Coal Co.	100	Working full.
Langdon & Co.	120	Idle.
Phila. Colliery—Kittaning Coal Co.	40	Working full.

Previous to April, 1873, the miners received 70 cents per ton for [illegible]ing coal; since that time two reductions of 10 cents each have been made. cutt

STATISTICS OF COAL PRODUCTION.

This is the only report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending May 15:

	1875.		1874.	
	Week.	Year.*	Week.	Year.
Wyoming Region.				
D. and H. Canal Co	71,705	1,044,892	58,091	892,709
D. L. and W. RR. Co	79,011	1,076,877	57,729	906,267
Penn. Coal Co	29,277	427,205	28,461	419,787
L. V. RR. Co	14,946	326,779	23,919	370,435
P. and N. Y. RR. Co	4,168	30,301	1,563	26,522
C. Rit. of N. J	16,313	127,670	29 677	446,056
Penn. Canal	..	..	..	..
Lack. and B. RR	..	41,426	..	50 018
	215,420	3,075,150	199,440	3,111,794
Lehigh Region.				
L. V. RR. Co	6,897	142 055	63,898	1,080,222
C. RR. of N. J	75	5,515	28,275	327,353
D. H. and W. B. RR	1,560	15,865	738	5,617
	8,532	163,435	92,911	1,413,192
Schuylkill Region				
P. and R. R. RR. Co	36,869	401,054	120,047	1,607,969
Shamokin and Lykens Val.	23,714	328,465	22,395	342,108
	60,583	729.519	142,442	1,850,077
Sullivan Region.				
Sul. and Erie RR. Co	..	5,419	775	10,521
Total	284,535	3,973.523	435,568	6,385,584
Increase	..	..	..	..
Decrease	151,033	2,412,061	..	..

* Year beginning January 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about seven per cent. of the whole production

Production of Bituminous Coal, 1875.

Tons of 2000 lb.	Previous.	March.	Total.
Blossburgh Region	43.802	25.994	69,796
Barclay Region	55,307	25,167	80 474
McIntyre Coal Co	9 801	5,916	15,807
Broad-Top Region	23,247	24,500	47,747
Cumberland Region	164,763	123,839	288,602
East Broad Top	3,881	3,317	7,198
Snow Shoe	11,901	7 483	19,384
Clearfield Region	106,776	91,237	198,013
Alleghany Region	29 747	14,361	44,108
Pittsburgh Region.			
West Penn. RR	29,813	16,442	46,255
Southwest Penn. RR	937	547	1,484
Gas Coal, Penn. RR	126,260	21,938	148,198
Pittsburgh Coal, Penn. RR	38,675	25,918	64,593
Saw Mill Run RR	287	11,996	12,283
Cleveland and Pittsburgh RR.	46,782	26,797	73 579
Pittsburgh, Cincinnati and St. Louis RR	115,478	68,929	184,347
Erie and Pittsburgh RR	17,870	6,007	23,877
Pittsburgh, Fort Wayne and Chicago RR	30,242	21,139	51,381
Castle Shannon RR	46,732	..	16,732
A. V. & P. R.R.	475	526	1 001
Pittsburgh and Connellsville RR	50,254	30,865	81,119
Monongahela Nav. Co	..	..	..
Keeling & Co	17,491	9.405	26,896
Wettengell & Gormley	4,613	2,184	6,797
J. W. Carlin & Co	..	..	..
Pittsburgh Va. & C. R.R.	6,444	3,303	9,747
Allegheny Valley R.R	92,681	..	92,681
Gray & Bell	2,120	1,341	3,461
St. Louis Region.			
St. L. A. & T. H. R. R. and Branches	61,943	33,121	95,064
Illinois and St. Louis	..	..	..
Indiana North and South RR	264	..	264
Evansville & Crawfordsville RR	5.151	2,483	7,634
Ohio & Mississippi RR	39,696	..	39,696
Sewanee Region.			
Tenn. Coal & R.R. Co	18,239	..	18,239
Kanawha Region.			
Chesapeake and Ohio RR	13,982	..	13,982
Warrior Region, Ala.			
South and North Alabama RR	6,928	3,792	10,720
Cahaba Region, Ala.			
South and North Alabama RR	2,790	1,700	4,490
S. R. & D. R.R.	2,324	1,147	3.471
Chicago B. & Q. R.R	77,295	32,524	109,819
B. & M. R.; R.R.	14,874	7,900	22,774
Union Pacific R. R.	35,597	25,772	61,369
Keokuk & Des Moines R. R.	..	..	..
Denver & Rio Grande	6,043	939	6,982
Cairo & St. Louis	3,106	..	3,106
	1,334,601	678,559	2,013,170

The following table does not give the entire production of our bituminous mines, but it is by far the fullest report published.

The Production of Bituminous Coal for the week ending May 15, was as follows:

Tons of 2000 lb., except where otherwise designated.

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lb	61,603	628,494
Barclay Region, Pa.		
Barclay R.R. tons of 2240 lb	5,110	100,901
Broad Top Region, Pa.		
Huntingdon & Broad Top R.R	6,364	73,790
*East Broad Top	1,731	15,003
Clearfield, Region, Pa		
*Snow Shoe	1,629	29 337
*Tyrone and Clearfield	12,213	272,691
Allegheny Region, Pa.		
*Pennsylvania R.R	7,478	80,074
Pittsburgh Region, Pa.		
*West Penn. R.R	4,784	71,082
*Southwest Penn. R.R	231	2,728
*Penn. and Westmoreland gas coal, Pa. RR	2,442	157,228
*Pennsylvania R.R	10.897	110,857
Kanawha Region, W. Va.		
†Chesapeake and Ohio R.R	....	43.987

* To May 7. † To May 1.

The Production of Coke for the week ending May 7.

Tons of 2000 lb.

	Week. Tons.	Year. Tons.
Tyrone and Clearfield	..	261
Alleghany Region	..	53
West Penn. R.R	592	17,026
Southwest Penn. R.R	9 044	178,418
Gas Coal, Penn. R.R	258	8,894
Pittsburgh Coal, Penn. R.R	1,320	31,609

The receipts at Buffalo, via. L. S. & M. S. R.R. for the week were 5,709 tons.

The exports of coal from Baltimore for the week were 2232 tons, and for the year, 20,586, as compared with 42,341 tons to the corresponding time in 1874.

The decrease of shipments of Cumberland coal over the Cumberland Branch, and Cumberland and Pennsylvania Railroads, amounts to 68,112 tons.

Belvidere Delaware RR. report:

	week.	year 1875.	year 1874.
The receipts of coal at Coal Port (Trenton)	..	206	75,130
" " " South Amboy	638	18,564	261,386
Shipments at Coal Port (Trenton)	..	196	72,493
" South Amboy	519	96.712	211,123

Receipts at Greenwich, Philadelphia:

	Bituminous.	Gas Coals.
Receipts	2,717	967
Shipments	2,780	900
On hand	901	236

The receipts at Port Richmond for the week were 2,000 tons, shipments 2,500 tons, and balance on hand 900 tons.

Shipments from Pictou, N. S.

	tons.
To United States	435
" West Indies	—
" South America	—
" Canada	2100
" Other Provinces	1201
	3736

Shipments from the Block House, Cow Bay, C. B., to the following destinations:

	week.	year.
Provinces	1022	1740
West Indies	—	486
	1022	2226

COAL TRADE REVIEW.

Duties.

Anthracite free. *Bituminous*, per ton of 28 bushels, 80 lb. to the bushel, 75c., gold.

All *slack*, or *culm*, such as will pass through a half-inch screen, per ton of 28 bushels, 80 lb. per bushel, 40c., gold.

Not otherwise provided for, per ton, 40c. gold.

NEW YORK, Friday Evening, May 21, 1875.

Anthracite.

The demand for certain sizes and qualities continues ahead of the supply, although consumers and dealers are only purchasing for their immediate wants. Orders are being filled much more promptly than they were three weeks ago, and speculators are decidedly weaker in their prices on all sizes, excepting stove, which is still held rather firm. Orders for stove are being filled in about three weeks after booking, while other sizes are supplied in less time. The quantity of coal coming to market is quite large, and with the wants of consumers constantly decreasing, there is nothing to indicate that there will be any trouble in supplying the actual necessities, unless the strike should continue to the time when it is felt necessary to commence putting in winter stock; this, however, does not seem probable. The output at the mines, last week, was 284,535 tons, or an increase of more than 12,000 tons over the previous week. The decrease in the production since January first, as compared with last year, is over 2,400,000 tons.

Price Circulars.—The Delaware and Hudson Canal Company, Delaware, Lackawanna and Western Railroad Company, and Pennsylvania Coal Company have issued price circulars for the month of June, under date of the 20th inst. The Delaware and Hudson Canal Company and the Delaware, Lackawanna and Western Railroad Company quote similar prices, which we compare with those of the corresponding month last year, as follows:

	1875	1874
Lump	$4.90	$4.80
Steamer	5.00	4.90
Grate	5.10	5.00
Egg	5.25	5.15
Stove	5.70	5.65
Chestnut	4.70	4.65

The Pennsylvania Coal Company quotes the following prices, as compared with June 1874:

	1875	1874
Lump	$4.85	4.65
Steamer	4.85	4.65
Grate	4.95	4.75
Egg	5.05	4.85
Stove	5.55	5.40
Chestnut	4.60	4.50

The above prices, as compared with this month, are an advance of 10c. per ton all around, by the D. and H. C. Co. and D. L. and W. R. R. Co., and 15c. per ton by the Penna. Coal Co.

The Anthracite Miners' Strike.—There is nothing to indicate when the men will be starved into submission, and it appears as if this only will end the strike. A few outrages are reportrd, but, generally speaking, matters have been very quiet in the anthracite coal regions. A press dispatch says:

"Pottsville, May 19.—There was a meeting of the Executive Board of the Miners' and Laborers' Association held here to-day, there being a full attendance of delegates. They contradict the statement in circulation that they are weakening and ready to yield to the demands of their employers. They decided by a unanimous vote to yield or compromise on nothing excepting $15 per week for eight hours' labor per day. This proposition has been formally sent to the President of the Coal Exchange, being the only concession the delegates were prepared to make."

This is doubtless intended to create sympathy for the miners, as they are well aware that the proposition to work by the day in the mines is altogether impracticable. The experience of the companies is, that the only way in which coal can be profitably mined, is by contract. In a mine where there are several hundred chambers, it will require almost an equal number of overseers to see that the miners do a fair day's work; there are so many chances for taking things easy when 200 feet up a dark chamber. The above proposition can only be a *ruse*, for there is not the least doubt that the *average* wages under the proposed reduction would be much greater than $15 per week.

Bituminous.

A very good demand continues for Cumberland and other bituminous coals. As stated before, some of the Cumberland companies are crowded with orders, although a few, not so well supplied, keep prices depressed. We have been reported some fair sales for the week under review, but without particulars. The trouble with the Boatmen's Union, on the Chesapeake and Ohio Canal, appears to be, at least temporarily, adjusted. The American Company has settled its troubles by making its trippage charge $30. The Maryland Company has again resumed shipments, but we are unable to learn on what terms.

The Miners' Strike in the Clearfield Region Virtually Ended.—Latest advices from the Clearfield Region state that the men have expressed, by vote, their willingness to resume work on the operators' terms; provided work is given to the Union leaders. This is considered an acknowledgement of defeat by the men, and the operators are determined to use every effort to break up the Union, and will not employ its leaders. During the week, several bodies of men have resumed work, armed, and under the protection of the Sheriff. There have been numerous arrests of miners, among whom was XINGO PARKS, a paid agitator, who, in default of $5,000 bail, was locked up. An attempt is being made to re-arrest JOHN SINEY, and place him under heavier bail. The operators claim to have sufficient evidence to send him to the penitentiary. The miners are constantly resuming work, and it is thought that by Tuesday or Wednesday of next week the district will be working to its full capacity, which is about 6,000 tons per day. See a statement of the Clearfield mines and their capacity, in another column.

Foreign and Gas Coals.—There have been no arrivals of foreign coal, and we are unable to learn of any sales. Domestic gas coals are quiet—the coal that is being mined going to the account of contracts made early in the season. An attempt will be made to work some of the mines in the Penn and Westmoreland district under protection—a number having expressed their willingness to work, if protected. We learn that there has been a sale of Block House coal, for gas purposes, in this market, price and quantity not given. The first engagement of freight on this order has been made at $2 per ton. The first shipment of coal, this season, from Pictou was made on the 7th inst., or a month later than last year. Up to the 15th inst., there had been shipped 3,736 tons of coal.

Freights.—Rates are somewhat weaker. We are quoted as low as $1.65 from Baltimore to Boston. Charters have been made from here to Boston at $1 25@$1 40, with about ten days' despatch.

Wholesale Prices of Anthracite Coal f.o.b., at the Tide Water Shipping Ports per ton of 2240 lb.

The following prices comprise only those of the Lackawanna, Scranton and Pittston Companies, for the month of June. Rates of all the other companies are in abeyance, pending the settlement of the strike.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
Lackawanna and Scranton at Elizabethport & Hoboken	4 90	5 00	5 10	5 25	5 70	4 70
Pittston at Newburgh	4 85	4 85	4 95	5 05	5 55	4 60
Wilkesbarre at Port Johnston	....	....	....	....	....	....
Plymouth, R. A.	....	..	....	....	....	....
Susque. Coal Co. at Amboy W.A.	....	....	....	..	....	....
Kingston at Hoboken	....	....	.. .	....	....	....
Lehigh Coals.						
Old Company at Port Johnston	....	....	....	....	....	....
Old Company's Room Run "	....	....	..	....	....	....
Sugar Loaf at "	....	....	....	....	....	....
Lehigh Coal Exchange "	....	....	....	....	....	....
Honey Brook at Elizabethport	....	....	....	....	....	....
Spring Mt. C. Co. at Hoboken	....	....	....	....	....	....
Beaver Meadow at South Amboy	....	....	....	....	....	....
Schuylkill Coals.						
Schuylkill white ash	....	....	....	....	....	....
Schuylkill red ash	....	....	....	....	....	....
Shamokin white and red ash	....	....	....	....	....	....
N. Franklin	....	....	....	....	....	....
Lorberry	....	....	....	....	....	....
Lykens Valley	....	....	....	....	....	....

Pittston coal is delivered to carts in New York or Brooklyn at 65 cents per ton in addition to the above rates.

	Per ton.
Freight from Hoboken and Weehawken to New York	40c.
" " Elizabethport & Port Johnston to New York	45c.
" " South Amboy to New York	50c.

Freight on Lackawanna coal from Roudout to New York, by boats or barges of the D. & H. Canal Co., 50c. per ton.

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn, at Greenwich, Philadelphia	$5 20	$6 50
" " at S. Amboy	6 00	6 50
Red Bank Cannel Pa., at Phil.	8 00	8 50
" " at S. Amboy	8 50	....
" Orrel, "	6 00	6 50
Youghiogheny, Waverly Co, at Baltimore	5 00	6 50
Despard, West Va., nominal "	4 75	6 50
Murphy Run, W. Va. at Baltimore	4 75	6 50
Fairmount, W. Va " "	4 75	6 50
Newburgh Orrel, Md. " "	4 75	6 50
Cannelton Cannel, W. Va., at Richmond.	9 50	11 00
" Splint, " "	5 00	6 50
Peytona Cannel, " "	9 50	11 50
Straitsville, " At Sandusky, O "	3 65	11 60

Foreign Gas Coals.

	Sterling.	Am. cur'cy.
Newcastle, at Newcastle-on-Tyne	10/6@12/9	6 50@ 7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel "	47/	18 00@20 00
" Gas Cannel "	30/	12 00
Scotch Gas Cannel, at Glasgow, nominal.	25/ Gold.	7 50
Block House, at Cow Bay, N.S.	2 00	5 50
Caledonia, at Port Caledonia	1 75	5 25
Glace Bay, at Glace Bay	1 80	5 50
Lingan, at Lingan Bay	75	....
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion and Vale mines, at Pictou	2 25	5 75

Steam and House Coals.

Broad Top, at the mine, $1,25; at Amboy	4 75@5 00	5 25@5 50
Cumberland, at Georgetown and Alexandria, Va.,	4 00@4 25	....@....
Cumberland at Baltimore	4 15@4 50	5 75@6 25
Clearfield, " Derby," " Kittanning," "Sterling," and " Eureka," at the mines, $1.25; at Greenwich, Phil.	4 60	5 65
James River, carbonite, at Richmond, Va	....	....
" bituminous, " nom.	....	....

Retail Prices in New York.

Anthracite.

Per 2000 lb.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$6 20	$6 40	$5 60
*Lackawanna Coal, del'd	6 75	7 00	6 25
Wilkes-Barre, delivered	6 50	6 75	6 00
Lehigh & Locust Mountain, del'd	....	....	....
Schuylkill Red Ash del'd	....	....	....

The cost of delivering Pittston coal ranges from 40 cents to $1 per ton, according to distance from the yard.

* Lackawanna grate is quoted 25c. per ton less than egg.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb				$23 00
Liverpool House Cannel	"	"	"	25 00
American Sterling	"	"	"	13 50
American Orrel	"	"	"	15 00@16 00
Red Bank Cannel	"	"	"	14 00
Carbonite	"	"	"	12 00
Cumberland	"	"	"	9 00
Acadia, Pictou, N. S.	"	"	"	14 00

Baltimore, Md. May 18, 1875.

Reported by our Special Correspondent.

Prices remain unchanged.

Boston. May 18, 1875.

Reported by our special correspondent.

CARGO PRICES TO TRADE.

Lingan coal	$ 5 75	Westmoreland, and Penn.	7 25
Caledonia	5 00	Waverly Co. Youghiogh'y	7 25
Pictou	6 15	Cannelton Cannel	11 75
Block House	5 60	Cumberland	6 25@ 6 50
Red Bank Cannel	10 00	Anthracite, .6 50@	7 25
Glace Bay	5 00	" Retail..7 50@	8 00
Sydney	7 00		

Buffalo, N. Y. May 18, 1875.

Reported by our Special Correspondent.

Prices remain unchanged.

Chicago, Ill. May 18, 1875.

Specially reported by Messrs. RENO & LITTLE, Coal Merchants.

No changes in prices of coal.

Cincinnati, O. May 11, 1875.

Reported by our Special Correspondent.

Please continue old quotations, as prices have not varied.

Cleveland, O. May 18, 1875.

The *Manufacturing and Trade Review*, undes date of the 18th inst., says: The market remains in a very unsettled condition. The Mahoning miners do not choose to work and Cleveland is depending upon Straitsville and Hocking Valley for a supply of domestic fuel. The furnaces, aside from the Cleveland Iron Company's furnace, have been obliged to stop for want of fuel.

The perplexities of this business are too great for human comprehension or endurance, and the least we say about it now, the better will people who want to buy coal be satisfied with the advantages of an open market. Yet it seems like an outrage against capital and enterprise that miners are not willing to take a fair rate for their labor, but prefer rather to insist upon prices and regulations which cannot be afforded by the coal producing proprietors.

Prices remain unchanged, notwithstanding the striking trouble, and dealers are entitled to considerable credit for their firmness.

Reported by our Special Correspondent.

Per ton of 2000 lb. on cars.

Youghiogheny, l'p	$4 40	Columbiana	$3 00
Youghiogheny, nut	3 50	Strip Vein & Steubenville	3 30
Briar Hill, according to quality	$3 65 to 4 00	Mountain Blossburg (blacksmith)	5 40
Massilon	3 25	American Cannel Coal Co.s Cannel	4 40
Hocking Valley	3 35		
Straitsville	3 35		

Detroit, Mich. May 17, 1875.

Specially reported by Messrs. ROBINSON & KEYS, dealers in all kinds of coal.

We have no change in prices to report as yet. But very little coal is being received, and owing to the scarcity of Le high coal and coke, the foundries are, or will be, compelled to stop work until supplies can be obtained. For steam purposes we are depending on Straitsville and Hocking Valley, and Ohio coals.

Erie, Pa. May 18, 1875.

Reported by our Special Correspondent.

Wholesale, per ton of 2,000 lb.

Bituminous f.o.b.

Briar Hill lump	$4 00	Beaver lump	$4 00

Indianapolis, Ind. May 18, 1875.

Specially reported by Messrs. H. MCCOY & Co.

Prices remain unchanged.

Louisville, Ky. May 18, 1875.

Specially reported by Messrs. BYRNE & SPEED.

Please report our coal market the same as last week, with 12c advance on Pittsburgh coal in the river.

Milwaukee, Wis. May 17, 1875.

Specially reported by Messrs. R. P. ELMORE & Co.

Retail prices per ton of 2000 lb.

Lehigh Lump	$10 00	Briar Hill, select	$8 50
Lehigh Prepared	10 50	Blossburg	8 00
Lackawanna	9 50	Pittsburgh	7 50

New Orleans, La. May 15, 1875.

No change in our market yet; wholesale prices are a little firmer at 35c.

Pittsburgh coal, retail, per bbl	nominal
" wholesale	32@35c.
" to steamboats, per box	50c.
" to manufacturers, per bbl	60c.
" shipments per hhd	$6 00
Anthracite, retail, per ton	$12 50
" wholesale per ton	....
Spadra (Arkansas) coal, retail, per bbl	....
Mt. Carbon, wholesale, per bbl	30c.
" " retail per bbl	65c.
Virginia Cannel, per bbl	90c.
Scotch Cannel, per bbl	1 00

Pittsburgh, Pa. May 18, 1875.

On Monday of last week, the miners of the Braddocks Field Gas Coal Co. came out for an advance in mining of one cent per bushel. The demand was not complied with, and the miners resumed work at the old rates, on the following Wednesday. The miners at several other mines on the Pennsylvania R. R. came out last week for different reasons, but have all resumed work. There is to be a meeting to-day of delegates from pits on the Pan Handle R. R., Little Saw Mill Run R. R, Castle Shannon R. R, and Keeling's mines, to consider the situation.

There is an improved local demand for coal, and an improved general demand for coke, with no change in prices.

Per ton of 2000 lb. and Bushel of 76 lb.

	per ton.		per ton
Youghiogheny coal	$2 00	Pittsburgh retail delivered	
" coke	2 00@2 25	per bushel	9c@10c
Connellsville coal	2 10	Anth'cite on cars Lehigh	$7 75
" coke	$2 25@2 50	" " Wilkes-Barre	6 75
Pittsburgh coal	1 85		

Twenty-five to fifty cents per ton additional for delivery.

San Francisco

From the *Commercial Herald*, May 6, 1875.

Imports from January 1st to May 1st, 1875:

Anthracite, tons	5,051	English, tons	21,409
Australian, tons	30,119	Vancouver Island, tons	21,441
Coos Bay, tons	11,812	Rocky Mountain, tons	22
Cumberland, tons	3,550	Seattle, tons	13,194
Mt. Diablo, tons (3 mos)	40,880	Bellingham By, tons	3,740

Our market continues to be well supplied with Bituminous from the Colonies, and from the Pacific Slope and British Columbia mines. Anthracite is, however, scarce and high, particularly Lehigh, which is much wanted, and is selling from the yard as high as $25 per ton. The *Camilla*, from Newcastle, N. S. W., is at hand with 1,112 tons; and the *Loch Dee*, from same, has 900 tons Coal, and 150 tons Coke—to a dealer. The *Empire*, from Coos Bay, has 400 tons. The *King Phillip*, from Baltimore, brought 1,500 tons Cumberland. The supply of this latter description is large, causing low prices to prevail. Cargoes of Scotch and English steam, to arrive, are offered at $9@10, according to quality and description. As before stated, Australian cargoes, to arrive, have been placed at $9@9 25, for future delivery. These low prices are the result of increased local supplies from the Black Diamond and other Mt. Diablo mines, and the promised increase from other Pacific Coast mines. We quote these at $6 25@8 25; Coos Bay at $10; Wellington, $10 50@11; Bellingham Bay, $8 50. The *Woosung* from Newcastle, N. S. W., has 921 tons.

THE BRITISH COAL AND IRON TRADES.

May 1, 1875.

North of England.—There has been a falling off in the demand for coal, and some of the pits are working short time. Mr. FOSTER, M. P., has made an award in the Durham miners' wages dispute of a reduction of 5 per cent. on underground wages, and 4 per cent. on overground. As a reduction of at least 10 or 15 per cent. was expected, much dissatisfaction is expressed by the mine owners. Prices of coal are as follows: Best households, 16/@17/; seconds, 12/@14/; unscreened, 6/ 6d.@7/ 6d.; gas, 9/ 6d.@/11 6d.; best coke, 17/@18/; and second qualities, 14/ 6d.@15/ 6d. There is a very fair amount of business doing in pig iron, although most buyers will not anticipate their wants. All the available furnaces are in blast, but owing to a short supply of ironstone it is feared some of them will have to blow out. The trade in manufactured iron is very much improved. Quotations are as follows: No. 1 foundry pig, 62/ 6d.; No. 3, 57/; No. 4 forge, 55/; rails, £7; common bars, £8; puddled bars, £5@£5 2/.

Barrow-in-Furness.—The iron trade is very quiet, with the exception of Bessemer qualities, which are in good request and firm. There is nothing to indicate that business will improve as the year advances. The following are the quotations: No. 1 Bessemer pig, 85/; No. 2, 82/ 6d.; No. 3, 80/; No. 3 hematite, 82/ 6d.; No. 4 forge, 80/; white and mottled, 75/.

Yorkshire and Derbyshire.—The improvement in the demand for coal is still maintained, considerable business being done with London. From time to time, considerable shipments will probably be made to the North of Europe, so that the prospects are good for a fair trade during the remainder of the season. With the exception of some difficulty in reducing the wages of topmen at some of the pits, there is but little trouble being experienced on the labor question. There is a fair amount of business doing in iron, while steel is in active demand, especially for railroad material. ROGERS & SON'S cutlers are on a strike, and threaten to start an independent business unless their demands are granted.

Manchester.—With the exception of the best qualities of coal, the demand is very much reduced, and prices inclined to weakness. The demand for gas coal is increasing, and considerable orders have been placed during the past week. The average pit prices of the district are as follows: Best coal, 14/ per ton; seconds, 12/ 6d.; best burgie, 7/ 6d.@7/ 9d.; common, 7/@7/ 3d.; best slack, 5/@6/; best coke, 20/; and small cokes, 12/@14/. In pig iron prices are a trifle easier, but this does not create a demand. The prices of the Lancashire makes are nominally maintained at 72/ 6d. per ton for foundry, and 67/ 6d. per ton for forge qualities, delivered in the district. There has been a trifle better inquiry for finished iron during the past week. Ordinary bars are quoted at £8 12/ 6d @ £8 15/.

Wolverhampton.—The coal trade is very quiet, only the best qualities being in fair demand and firm in prices. With the exception of a fair demand for sheets and Shropshire cold-blast pig iron, the iron trade is in a very quiet and unsatisfactory state. Marked bars remain on the basis of £10 10/; £11, and £11 12/ 6d. per ton, respectively, for the three ruling brands. Common bars are offering at £8 15/. Cold blast Shropshire pig is quoted at £6 10/.

Monmouthshire and South Wales.—The lock-out is ended, the masters having thrown open their pits to the men at a reduction of 15 per cent., at which reduction the men are only employed from day to day. Some of the miners have already submitted to the masters' terms, and resumed work, while the large majority are still idle, protesting against the reduction (which is generally considered quite liberal) and the "day-to-day" contracts. It is believed that work will soon be begun in all the districts. Trade is so thoroughly demoralized that it will be several months before it will begin to show indications of what it was before the strike, and it is quite probable that an additional reduction will have to be made first. The masters, however, are inclined to delay as much as possible in making it.

Scotland.—On Tuesday the price of warrants had a further fall to 68/. The prices of the principal makers' brands have

not been, as yet, much affected by these fluctuations, which have resulted chiefly from the uncertainty that prevailed to some extent with regard to the success of the reduction imposed on the miners. The makers' quotations are as follows: Gartsherrie, No. 1, 75/; No. 3, 72/; Coltness, No. 3, 71/; Summerlee, 76/ and 70/; Langloan, 76/ and 70/; Govan, 71/ and 69/; Calder, 75/ and 70/; Shotts, 75/ and 71/; Carnbroe, 72/ 6d. and 69/; Monkland, 71/ and 69/; Clyde, 71/ and 69/; Glengarnock, 73/ 6d. and 69/; Eglinton, 69/ and 67/; Dalmellington, 69/ and 67/. Rinnell, 70/ and 67/ 6d.; Carron, 70/. The shipments of pig iron from Scotch ports for the week ending the 24th ulto., amounted to 13,291 tons, showing an increase of 4,520 as compared with those of the corresponding week of 1874. The imports of Middlesbrough pigs at Grangemouth for the week were 4,750 tons, being 3,360 more than in the corresponding week of last year. The malleable trade continues very dull, and prices are on the decrease. Coals are now in better demand, in consequence of a large increase in the shipping orders. The export trade is heavier at present than it has been for at least twelve months. Coalmasters have been enabled to supply freights at lower terms than those lately prevailing, in consequence of the reduction in the miners' wages, and it is anticipated that some of the large stocks accumulated at the collieries will be well cleared off, should the export demand continue for any time as active as it is at present. A strike took place at the close of last week among the furnacemen, mechanics, and laborers in the employment of the Coltness Iron Company. Their wages had been reduced by 10 per cent. and, on Saturday evening, when the reduction came into force, the night-shift men did not put in an appearance. The consequence was that the furnaces were totally stopped. On Sunday, the manager made an attempt to compromise the matter with the men, but in this he failed. Two only of the twelve furnaces were set agoing on Monday.

Freights.

Per ton of 2240 lb.

PORTS.	From Baltimore and Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me	....	....
Albany	1 90	....
Amesbury, Mass	....	....
Bangor, Me	....	1 60
Bath, Me	1 70	1 60
Baltimore	....	....
Boston, Mass	1 65	1 60
Bridgeport, Ct	1 50	85
Bristol, Ct	....	1 30
Derby	....	1 10
Dighton	....	....
East Cambridge	....	††1 60
Fall River	1 50	1 30
Hackensack	....	....
Hartford	2 35	1 40
Hoboken	....	....
Hudson	....	....
Jersey City	....	....
Middletown	....	1 35
Mystic	....	....
Newark	....	....
New Bedford	1 60	1 30
Newburyport	1 75	1 60
New Haven	1 50	85
New London	1 50	1 00
Newport	....	1 30
*New York	....	§ 40
Norfolk, Va	....	....
Norwalk	1 60	85
Norwich	1 65	1 15
Pawtucket	1 75	‡‡1 30
Philadelphia	85	....
Portland	1 65	1 50
Portsmouth, N. H	1 65	1 55
Providence	1 50	1 30
Petersburg, Va	....	....
Richmond, Va	....	....
Rockport	....	....
Saco	....	....
Sag Harbor	....	1 00
Salem	2 00	1 50
Savannah, Ga	....	....
Stamford	....	85
Stonington	....	1 10
Taunton	....	1 50
Trenton, N. J	1 00	....
Troy	....	....
Warren, R. I	....	1 30
Washington	....	....
Wareham	1 75	1 30
Wilmington, Del	85	....

§ Under 150 tons, 50c. per ton.
†† 30c. per ton per bridge extra.
‡‡ Towing extra.
* The rate by barge from this point is $1.60.

Philadelphia to Boston	$2 00
" " Providence	1 75
" " New York, free of discharging	85

Import Duties.

The following are the duties in Gold:

Flat Iron, not less than 1, nor more than 6 inches wide, nor less than ¾, nor more than 2 inches thick. *Round Iron*, not less than ¾, nor more than 2 inches in diameter, and *Square Iron*, not less than ½, nor more than 2 inches square per pound 1 c.

Flat, Round or Square Iron, of larger or smaller sizes than the above mentioned, per lb. 1½c

Provided, that all iron in slabs, blooms, loops, or other forms less finished than bars, and more advanced than pig iron, except castings, shall pay the same as iron in bars.

Provided, that none of the above iron shall pay less than 35 per cent.

Railroad Bars—Iron 70c. per 100 lb.
Railroad Bars—Steel $1.25 per 100 lb.
Boiler plates, or other plate iron not less than 3-16 of an inch thick, per lb 1½c.
Scrap castings per ton $6 00
" *wrought* " " 8 00
Pig iron per ton 7 00
Iron ore 20 per cent. *ad valorem*.
Antimony, crude or regulus, 10 per cent.
Copper Ore—On all fine copper contained therein, 3c per lb.
Old Copper, fit for manufacture only, 4c. per lb.
Copper, pigs, bars, ingots or plates, 5c per lb.
" sheets, bolts, nails, spikes, rods, pipes, &c., 45 per cent.
Tin, in bars, blocks or pigs, and grain tin, free.
Tin Plates, or sheet, and terne or taggers tin, 1 1-10c. per lb.
Lead—Bars or pigs, 2c. per lb. Old lead, for manufacture only, 1¼c. per lb. Pipes shot and sheets, 2¾c. per lb.
Zinc, in blocks or pigs, 1¼c. per lb; in sheets, 2¼c. per lb.; manufactures of, 35 per cent.
Quicksilver, free.

IRON MARKET REVIEW.

New York.

May 21, 1875.

American Pig.—There is no improvement noticeable in the general demand. We note sales of 800 tons of Thomas No. 2 X and No. 2, at $26 and $25, respectively; 2,300 tons of other makes, without particulars; and about 5,000 tons of mixed brands of No. 2 X and forge, to Pipe Works in Philadelphia, at prices not given, but supposed to be very low. The nominal quotations remain unchanged, as follows: No. 1 foundry, $27@$28; No. 2, $25@$26; forge, $23@$25. As will be noticed above, the selling prices for large quantities are not given, and the general impression appears to be that they are so low that, if published, they would create a general break in prices. It is said that some hypothecated iron will soon be forced on the Philadelphia market.

Scotch Pig.—We note sales of 100 tons of Eglinton at about $28.50 and 100 tons Coltness at $32. Prices have declined in Glasgow about 1s. 6d., below our quotations of last week. The stock in this market is said to be less than 2000 tons, which, with an ordinary demand, would be but a very moderate one. The actual consumptive demand is exceedingly light, and the sales that are taking place only result in the iron changing hands, being confined to dealers. It is almost impossible to give quotations, but the following may be considered as nominal: Eglinton, $30@$31; Coltness, $33; Glengarnock, $32; Gartsherrie $31.50.

Rails.—We are reported sales aggregating 800 tons of 56 lb. at a price equal to $51.25 delivered at tide-water. There are some negotiations going on which will probably result in business soon. We continue to quote American iron rails at $48@$50 at mills, and steel at $70@$75.

Old Rails.—There is nothing doing in these; $26 is bid and $27 is asked.

Scrap.—We are reported a sale of 1100 tons, at Chester, Pa., said to be at $35. In this market we quote at $32@$34.

Boston.

May 15, 1875.

The *Commercial Bulletin* says: "Pig is unchanged in any feature, unless it might be considered that rather a more general solicitation of offers and orders was an item to note. The sales are exceedingly trivial, being confined to the wants of small foundries, and from them the business is of a hand-to-mouth character. Quotations again begin to show considerable variety. Certain popular brands hold their range very strongly from principle, but then most everybody has "something to show that might answer just as well at $2 less or so." The market is neither strong nor weak, but holds a nominally steady position, possibly more disposed to meet buyers' views than a week ago. This has had its effect on scrap and old stock as elsewhere reported. We quote on wharves No. 1, $29@33; No. 2, $25@28, and gray forge $22@27, the outside ranges to be stated as above the market. New York advices show a spirit of concession there of 50c. a ton on 100 ton lots. This is for lots in yard. On the few brands not in stock prices are strong for future delivery. We quote Hoboken $27@29, No. 1; $24@28 No. 2, and $22@26 gray forge.

"Bar is having a fair and steady jobbing trade, with a much better feeling among jobbers and consumers. The stocks generally are light, with the mills nearly all over a month behind now on orders. This is especially the case from Pittsburgh, whence advices have been received of inability to meet a demand on certain specific sizes before July." The reports from Ohio are of a similar tenor. This does not refer to common iron but to refined. The market here is strong at $60. Special small sizes in large lots bring $5 more. Common iron is slow at $54@56.

"Copper continues to hold steady at 23c. for spot and 23¼c. for June. There is very little doing either for legitimate trade or speculation. The mail advices from London up to the first of May are conflicting, but generally reflect that point held wholly by speculative influences. The reports from Chili are awaited with interest, by which the American speculators expect to know the approximate stock that will be on the Continent and in England by the first of July, a fact which has some influence on the semi-annual dividends here. We quote 23@23¼ for spot the last price for May. New Sheathing 28c.; Bolts and Braziers 30c.; Yellow Metal Bolts 28c.

"Lead is ⅛c. higher on domestic for the week, ruling strong at 6c. currency. Foreign is unchanged at 6¾c. gold. The sales are light, and stock sufficient for the prospective trade. The advance is under the influence of a speculative turn. Antimony is without request, and quoted at 12c. gold per pound; Sheet and Pipe 9½c. cy; Tin-Lined Pipe 16½c.; Bar lead 9½c. less usual trade or 10 per cent. discount.

"Spelter is selling rather moderately. The makers have combined and advanced the price from $6 50 to $7 30 currency, 30 days, or $7 15 currency, prompt cash, which has restricted business materially. Sicilian is quiet, quoting nominally $7 30 gold.

"Tin is dull and inclined to droop in consequence of unfavorable advices from London. Our quotations are nominal. Plates are quiet. We quote Straits 20; Banca 24¼; Refined English 19¾c. gold. Plates are active; we quote Charcoal I. C., $9 50@10; Coke $7 75@8; and Terne at $8 50@11 gold.

Cincinnati.

May 18, 1875.

Specially reported by Messrs. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

We have no change to report in our Pig Iron Market. Below we give you the closing quotations:

CHARCOAL.	
Hanging Rock, No. 1, Foundry	$28 00@30 00—4 mos
" No. 2, "	26 00@27 00—4 mos
" Mill	26 00@ —4 mos
Tennessee No 1, Foundry	28 00@29 00—4 mos
Tennessee. No. 2 "	26 00@27 00—4 mos
" Mill	26 00@ —4 mos
Missouri, No. 1, Foundry	@ —4 mos
STONE COAL.	
Ohio No. 1, Foundry	27 00@28 00—4 mos
" No. 2, "	26 00@27 00—4 mos
Ohio Mill	25 00@26 00—4 mos
Missouri, No. 1, Foundry	29 00@30 00—4 mos
" No. 2, "	28 00@29 00—4 mos
" Mill	27 00@28 00—4 mos
CAR-WHEEL.	
Hanging Rock, C. B	40 00@50 00—4 mos
Tennessee "	35 00@40 00—4 mos
Missouri "	35 00@40 00—4 mos
Alabama "	35 00@40 00—4 mos
BLOOMS.	
Charcoal	75 00@ 85 00—cash
SCRAP IRON.	
Cast	75c.@ 1c00. cash
Wrought	1 00@ 1 50—cash

Chicago.

May 10, 1875.

Specially reported by Messrs. ROGERS & Co., dealers in Scotch and American pig iron.

Quotations are as follows:

No. 1 Coltness	$46 00@ ....
No 1 Gartsherrie	45 00@ ....
No. 1 Summerlee	44 00@ ....
No. 1 Glengarnock	42 00@ ....
No. 1 Eglinton	40 00@ ....
Warner's "American Scotch"	38 00@ ....
Massilon No. 1 Foundry	35 00@ ....
No. 1 Grand Tower Mo. ores (Bituminous)	31 00@ ....
No. 2, " " "	29 00@ ....
No. 1 Mill	27 00@ ....
Union "A" 1 (Anthracite)	28 00@ ....
Union "B" 1 (Anthracite)	27 00@ ....
No, 1 Lake Superior (charcoal)	32 00@ ....
No. 2 Lake Superior "	30 00@ ....
No. 3 Lake Superior "	33 00@ ....
No. 4 Lake Superior "	35 00@ ....
Bessemer Steel Rails	76 00@ ....
New Iron Rails	52 00@ ....
Old Rails	28 00@ ....

Cleveland.

May 18, 1875.

Specially reported by Messrs. C. E. BINGHAM & Co., dealers in pig iron and iron ore;

No. 1, Lake Superior Charcoal	33 00@....
No. 2, " "	32 00@....
No. 3, " "	33 50@....
No. 4, " "	34 00@....
Nos. 5 and 6 "	35 00@....
No. 1, Bituminous foundry	29 50@....
No. 2, " "	28 00@....
No. 1. " Gray Forge	26 00@....
American Scotch, No. 1, Cherry Valley	32 00@....
" " No. 2	28 00@....
No. 1, Massillon	31 50@....
B—1, "	29 50@....
No. 2, "	27 00@....

The *Manufacturing and Trade Review*, under date of the 18th inst., says: There has been no change in the pig iron rates within the week past, and prices remain firm. The demand has improved somewhat and sales were increased, ranging from 300 to 500 tons per day from all the yards. Foundry irons are in most demand, the stock of which is very light. New supplies are expected from Lake Superior within ten days, among which are several thousand tons of the Morgan brand, some of which will come down on the first boat. One lot of 1,000 tons, of a special brand, was shipped this week by rail to Boston, on a special order, at market rates.

The ore trade still promises fairly, with inquiry extending over quite an extent of territory. The first cargo of the season arrived Sunday night, from Ogdensburgh, per schooner Geo. G. Houghton, 400 tons, consigned to C. E. Bingham & Co. A cargo of Lake ore also arrived from the "Soo," where it had been frozen in all winter.

Louisville. May 18, 1875.

Specially reported by Messrs. GEORGE H. HULL & Co.

The market is dull, with small sales and a strong tendency to inside quotations. Round lots could not be sold except at some concession in price.

The usual time, 4 months, is allowed on the quotations below.

HOT BLAST—CHARCOAL.

No. 1 foundry, from Hanging Rock Ores	$28 00@29 00
No. 2 " " " "	26 00@27 00
No. 1, Mill, from " "	25 00@ ....
No. 1, foundry, from Alabama, Georgia and Tennessee ores	26 00@27 00
No. 2, foundry, from Ala., Geo'a and Tenn. ores	25 00@26 00
No. 1, Mill, from " " " "	25 00@ ....

HOT BLAST—STONE COAL AND COKE.

No. 1, foundry, from Hanging Rock ores	27 00@28 00
No. 2, " " " "	25 00@26 00
No. 1, Mill, " " " "	24 00@25 00
No. 1, foundry, from Ala., Geo'a and Tenn. ores	26 00@27 00
No. 2, " " " "	25 00@26 00
No. 1, Mill, " " " "	24 00@25 00
No. 1 foundry, from Missouri ores	28 00@29 00
No. 2 foundry, from Missouri ores	27 00@28 00
No. 1 Mill, from Missouri ores	27 00@28 00

COLD BLAST—CHARCOAL.

Car Wheel from Hanging Rock ores	40 00@50 00
" " Tennessee "	35 00@37 00
" " Alabama and Georgia ores	38 00@40 00
" " Kentucky ores	30 00@42 00

Milwaukee. May 18, 1875.

The following are the present prices, per ton of 2,240 lb.:—

Frankfort L. S. Charcoal,	No. 1	$30 00
" " "	No. 2 & 3	28 00
" " "	No 4 & 5	31 00
" " "	No. 6	35 00
Mil. Anthracite L. S.,	No. 1	30 00
" " "	No. 2	28 00
Wisconsin Iron,	No. 1	26 00
Mahoning Valley Bit's	No. 1	32 00
" " "	No. 2	30 00

Pittsburgh. May 15, 1875.

The *Commercial* of May 15, says:

"There has been a little more inquiry for pig iron this week than for some time past, and the reports show an increase of sales, but the price remains substantially the same as at date of our last report. We have heard of the sale of two or three lots of about 1,000 tons each, at prices a little below quotations, but are without particulars, therefore cannot include them in our report. We also understand that Cleveland and Cincinnati parties have been buying and offering to buy gray forge iron from the furnaces in the valleys, at $23 00@23 50, four months, on cars at furnaces, and that, at these figures, there is more iron being sold each week than is being made; therefore, several of the furnace companies have withdrawn their iron from this market for the present.

"We are reported the following sales:

BITUMINOUS COAL SMELTED FROM L. S. ORE.

400 tons gray forge	$24 00—4 mos.
400 tons gray forge	24 00—4 mos.
300 tons gray forge	24 00—4 mos.
250 tons gray forge	24 00—4 mos.
250 tons neutral	22 00—cash.
200 tons gray forge	23 00—cash.
160 tons white C. S. forge	21 00—4 mos.
100 tons gray forge	24 00—4 mos.
100 tons gray forge	24 00—4 mos
100 tons white and mottled	22 00—4 mos.
100 tons No. 1 foundry	25 00—cash.
65 tons gray forge	23 00—cash.
55 tons No. 2 foundry	25 00—4 mos.
30 tons No. 1 foundry	27 00—4 mos
20 tons No. 2 foundry	25 00—4 mos.
20 tons No. 2 foundry	25 00—cash.

CHARCOAL.

150 tons Nos. 1 and 2 foundry Hanging Rock	$30 00@31 00—4 mos
20 tons Eastern cold blast	38 00—4 mos

ANTHRACITE.

150 tons close gray	$21 00—4 mos

BLOOMS.

40 tons charcoal	$75 00—cash,

The *American Manufacturer* says, Wednesday, May 19, 1875:

PIG IRON.—There has been rather more doing in pig iron within the past week, as will be seen by reference to the report of sales below; in addition to what was sold to the mills here, we understand that Cleveland, Cincinnati and other points have been buying at the furnaces in the Shenango and Mahoning valleys and paying better prices relatively than can be obtained here. The sales to go to Cleveland and Cincinnati are said to have been within the range of $23@$23 50, 4 mos., against $24, 4 mos., here, from which latter must be subtracted from $2 to $2 50 per ton for cost of transportation, commissions and other necessary expenses. If Pittsburgh were dependent mainly, as she was a few years ago, upon the valleys above referred to for her supplies, she would be obliged to pay more for pig to-day than she is; it is claimed that the furnaces here can produce the article at a less cost than elsewhere, and then nearly all our Pittsburgh furnaces are owned by Pittsburgh mills, and as their product is divided up among them there is not much of it thrown upon the market, and then it curtails the demand for the product of other points. The general position of the market, however, does not differ much from that of last week. There has been no change in prices, although possibly the general feeling on the part of producers, in view of an increased demand, is more hopeful; and many of them are refusing to accept current rates, believing, as they do, that better prices are only a question of a little time, and a strong point advanced in support of this is that the stock of good standard forge irons has been, and is still, very generally overestimated. However, the mills very generally have very fair stocks, and the indications are that they will buy only as their necessities require, and if they adhere to this course, producers will not be able to put up prices as rapidly as they are now calculating upon; while the future of the market is very uncertain the general outlook at this writing warrants the prediction that there will be no very decided change in prices either way before the first of July.

MANUFACTURED IRON.—Trade continues fairly active, the mills are all in operation, many of them working double turn, and it is evident, therefore, that they have not yet exhausted their orders, and there is not much doubt but they will have all they can do during this and next month. It is still complained that rates are too low to be remunerative, and while those mills working on specialties, in which there is not so much competition, are doing very well, there is an overproduction of the ordinary sizes, hence rates are kept down to a point that affords little or no margin for profit. We continue to quote upon a basis of $2 35@$2 40 for merchant bars, Pittsburgh classification.

San Francisco. May6, 1875.

From the *Commercial Herald*.

We note that the price of Pig Lead is advancing at the East, with sales in New York of 90 tons Selby's at $5 82½, gold, from wharf. The *Colima*, for Panama, carried en route for New York, 468 tons Selby's refined Pig Lead. With us the spot market for Pig iron continues bare and prices firm. Of late, Oregon has ceased sending us supplies. We quote Eglinton at $46; Glengarnock No. 1, $48. Large sales for forward delivery in the autumn may be noted of the latter brand at $35. The manufactured Iron, etc., seems to be largely demoralized. Iron Pipe has been sold at 6c. per foot; Boiler Tube, 35@37½c. per foot. These are exceedingly low rates as compared with those ruling a year ago. Tin Plate is in improved demand. We quote Tin Plate, Coke, $9 25@10; Charcoal do. $11@12, according to brand; Banca Pig Tin, 28c.; Straits do. 26c.; Australian do. 25c. 100 tons Scotch Pig Iron to arrive sold private.

St. Louis. May 12, 1875.

The tone of the market is about the same for both materials and manufacturers as it has been for weeks past. However, from the increasing quantity of pig metal which is being produced and thrown on the market, the price of that article is weakening. No. 1, mill pig is selling now at $25 cash. Old rails at $29 cash. Wrought scrap at $1 10. All the mills have a fair quantity of work.

The Vulcan is running on small rail; La Clede is running full day turn; Helmbacher day turn; McDonald, day turn with the hammers; East St. Louis Rail Mill, day turn; St. Louis Bolt and Iron company, double turn with full mill.

Iron Mountain ore is selling at $6 per ton. Other ores at $5 50. They could be sold lower, and business would be much brisker if the railway companies would only pursue a liberal policy and carry materials at the old rates. But the high and arbitrary rates prevailing, discourage manufacturing at St. Louis and encourage it at other points.—*Mines, Metal and Art.*

METALS.

NEW YORK, Friday Evening, May 21, 1875.

Gold Coin.—During the week past gold has ranged from 115⅛ to 116¼, and closed to-day at 116¼.

Bullion.—Fine silver bar is quoted at $1 25@$1 26; gold, per ounce, and fine gold bar, at par ($20 67, gold per ounce) to ⅛ per cent. premium.

Copper.—The business done since our last, has been in a small way. The present quotations are 23c.@23¼. By cable, yesterday, Chili bars were quoted at £82. The indications are that new copper will arrive here about the 10th to the 15th of next month.

Messrs. JAMES & SHAKSPEAPE, of London, under date of May 8, say: "Bars have met with steady sale at slightly improved rates, but values are somewhat affected by 'bear' sales for forward delivery, which operations have been much in vogue for the last twelve months, and are a comparatively new feature in the trade. As these transactions alone would scarcely produce the desired effect, they are generally accompanied by adverse rumors of the position and prospects of copper, and the general public, being unable to test the accuracy of the reports, accept the conclusions as correct, and shape their operations accordingly." The following shows the position of copper in the European markets to be a very favorable one: The stocks of copper in Liverpool, Swansea, London, and Havre, and Chili, chartered and afloat, on the 1st inst, were: 30,163 tons, as compared with 32,568 tons, April 1st, or a decrease of 2,405 tons. The stocks, May 1st, 1874, were 36,997 tons, and May 1st, 1873, 38,491 tons. The price of bars on the 1st inst. was £83, as compared with £75, May 1st, 1874, and £88, May 1st, 1873. The deliveries during April were 66,55 tons; and from January 1st, 21,329 tons, as compared with 20,570 tons for the first four months of 1874, and 19,715 tons in 1873.

Tin.—There is no improvement noticeable in either pig or tin plates in this market; the business doing is only in a jobbing way. The quotations are as follows: Straits, 19c.; Refined, 19c.; L. & F., 18¾c.; and Banca, 23¼c.@24c. per lb. Charcoal tin plates, $8 75@$9 per box; ternes, $7 75@$8; coke tins, $7@$7 25. Prices all gold. A telegram from London, to-day, says: "Charcoal plates firm; Straits, £83 10s." This is an advance of £1 10s. above yesterday's quotations. A telegram yesterday quoted Straits, at Singapore, at $22 per picul, with considerable business for America. The vessel *Jupiter T.*, containing about 5,000 pigs of tin, consigned to this port, is reported as lost on Bird's Island, Algoa Bay.

Messrs. VAN DANTZSEN & NORTH, of London, under date of the 6th inst., say: "A very moderate business was done during the month, and Straits gradually fell from £87, until £82 was touched, but only 10 tons changed hands at this, and the value has improved to £84 since the large delivery of last month was known; from this it has again gone back to £82 10s. The principal holders of Australian have not been in the market, and, consequently, transactions in that quality have been very trifling. Price fell from £87 to £80, and recovered to £81 1 s. There has been a greater disposition to sell during the last week, in spite of the low price. The delivery in April was very large—767 tons from Holland—of which 83 tons to England; and from London about 1,300 tons. However, in looking at the position of the article, we cannot help being struck with the fact that, in spite of the large deliveries, the available stocks are 412 tons larger than on the 1st of April. The quantities of Straits, Billiton, and Australian afloat are 1,234 tons less, but there are no real signs of reduced production. Prices certainly are decidedly lower, and any parties now investing do so on a much better basis than present holders—but what is there in the position of the trade generally, and the article in particular, to lead to the belief in a rapid or important rise in value? The answer rests in the future, but the problem is difficult to solve. The production of Billiton Tin during 1874, according to official returns, was 126,000 Slabs against 102,000 Slabs in 1873, showing an increase of 24,000 Slabs, equal to 768 tons. The 20,000 Slabs offered by public sale in Java, on the 12th ult., realized an average of f. 55. 0 per picul, equal to about f. 50½ per 50 Kilos laid down in Holland, or a parity of about £86 laid down here. There was a stock of Banca Tin on the Island of Banca, on the 31st of December, (which included the production of 1874) of 154, 00 Slabs, equal to 4,930 tons against 126,000 Slabs in 1873, which, it is worthy of remarking, is precisely the production of the Billiton Mines for the past year! The next sale of Banca will be held in Rotterdam on 26th inst., and consist of 22,800 Slabs. The Dutch market has been far from active, and closing values are: Banca f. 50, and Billiton, f. 47½. English Tin has been in moderate demand, and price has fallen to £90 for Common Ingot, £91 for bars." The stocks in store and afloat on the 1st inst., (Australian estimated) were 10,417 tons, as compared with 10,626 tons April 1st; 5,905 tons, May 1st, 1874, and 5,811 tons May 1st, 1873. The quantity brought into market since January 1st was 9,471 tons, as compared with 5,891 tons, 1874, and 5,403 tons, 1873. The deliveries during April were 2,038 tons, as against 1,009 tons in the corresponding month of 1874, and 995 tons, 1873. From January 1st they were 6,346, 3,855 and 3,546 tons respectively, for 1875, 1874 and 1873.

Lead.—The business doing in this market is only in a very small way, and the total sales will not aggregate over 100 tons. The quotations remain at 5·95c.@6c., gold. Foreign is very quiet at 6¼c.@7c. gold. Our latest mail advices from London say: "Lead is in active demand, having advanced £2 during the month, and is quoted at £22 15s. @£23 for good soft English pig."

Spelter and Zinc.—There is only a hand-to-mouth business doing in domestic Spelter, at 7·15c @7¼c. currency. The combination is firm in the maintainance of its prices. Sheet zinc is very quiet at 8¾c.@9c. gold.

Quicksilver in this market is quoted at 80c. Our latest London advices, under date of the 6th inst, say: "Quicksilver has fallen from £15 to £12; a fair business has been done the last few days at the latter figure."

The San Francisco *Commercial Herald* of May 6, says: The receipts are liberal, and the demand fully equal thereto. We quote the export price at 65c.; for local use, 70c. Exports by sea the past week have been:

To	Flasks.	Value.
Chile	200	$10,710
China	892	47,251
Japan	20	1,050
Australia	120	6,410
New Zealand	15	786
Totals	1,247	$66,207

The exports of quicksilver by sea for April were 2,463 flasks, valued at $148,706. The receipts for the same month aggregate 3,818 flasks.

Antimony is firm, but quiet at 12½c.@13c. The London price is still £58, which would make the cost of importation between 13½c. and 14c. gold.

FINANCIAL.

New York Stocks.

May 21, 1875.

The New York Stock market closed yesterday excited, and lower; fluctuations during the week have been very wide, and the market generally irregular.

The rumored negotiations between the Erie Railroad Company and the Delaware, Lackawanna and Western Railroad Company, and the Delaware and Hudson Canal Company, noted in our last, have not been consummated as yet. The interest of the Erie Railroad Company in the coal lands referred to is understood to comprise about 40,000 acres, 27,000 acres of which are bituminous, and the remainder anthracite. This property is represented by various companies, of whose stock the Erie Company owns a controlling interest. Should any arrangement be effected by the above companies, the following will probably comprise the outline of the negotiations: The Delaware, Lackawanna and Western Railroad, and the Delaware and Hudson Canal Companies lend to the Erie Railroad Company $500,000 at 7 per cent., payable on the 1st of January next, taking as collateral security the Erie Company's coal lands. If the loan shall not be paid at maturity the sum advanced is to form a portion of the purchase money at a price for the coal lands which is now fixed. In the meantime, the two creditor companies enter into possession and work the lands jointly, thus diverting from the Erie at once a valuable coal traffic.

At an auction sale on the 19th inst. the following securities were sold at the prices annexed: 3,000 D. & H. Canal, reg. 1884, bonds, at $108; 158 shares of the Manhattan Gas Co., at from $294 to $297.

	Lowest.	Highest.	Closing.
Pennsylvania Coal Co	—	—	—
Consolidation Coal Co	48	48¾	48½
Spring Mt. Coal Co	—	—	—
American Coal Co	—	—	—
Maryland Coal Co	—	—	—
Cumberland Coal and Iron Co	—	—	—
N. Y. & Nova Scotia Iron Co	—	—	—
Del., Lack. & West. R.R. Co	118½	119⅞	118¾
New Jersey Central R. R. Co	105½	112	110½
Delaware and Hudson Canal Co	120¾	121⅜	120¾
Quicksilver Mining Co, prefrd	—	—	22
" " Common	13	18	18
Mariposa Land & Mining Co. asst. pd.	—	—	—
St. Louis & Iron Mountain R. R.	21	21½	21
Wilkes-Barre Coal Co	—	—	—

Sales for the week, ending May 20th, inclusive, were as follows:

	Shares.	Price.
Del., Lack. and W. RR.	2,045 at from	118¾ to 119⅞
Del. and Hudson Canal	220 "	120¾ " 121⅜
New Jersey Central RR	935 "	105½ " 112
Quicksilver Mining Co	3,000 "	13 " 18
Consolidation Coal Co	927 "	43 " 48¾
Mariposa Land & Mining Co.	.... "	.. ".....
" Assessment paid	.... "	.. ".....
" Preferred	.... "	.. ".....
Maryland Coal Co	.... "	.. ".....
St. Louis & Iron Mountain R. R.	515 "	21 " 21½
Spring Mountain Coal Co	.... "	.. ".....
Quicksilver Mining Co., prefd	200 "	22 ".....
Pennsylvania Coal Co	.... "	.. ".....
American Coal Co	.... "	.. ".....
Total Sales	7,842 shares.	
Sales for the week previous	11,098 "	
Decrease	3,256 "	

The following are the sales of bonds for the same period:

	Amount.	Price.
Del., Lack. & W. RR. convertible,	$12,000 at from	122 to 122½
N. J. Central RR. 1st consolidated mortgage bonds	54,000 "	105½ " 106
St. Louis & Iron Mount'n 1st Mtg bonds,	3,000 "	92 ".....
St. Louis & Iron Mountain, 2d Mtg. bonds	.... "	.. ".....
N.J. Central Con. Convt.	4,000 "	113 ".....
" " 1st Mtg. N.	.... "	.. ".....
Del. & Hudson Canal, 1st Mtg. Reg. bonds, 189[illegible]	.... "	.. ".....
Del. & Hudson Canal, 7s, 1894,	4,000 "	107⅜ ".....
Del. Lack. & W. R. R., 2d Mtg.	.... "	.. ".....
C. & O. R.R. 1st Mtg. Coupon	.... "	.. ".....
Total Sales	$77,000	

Philadelphia Stocks.

PHILADELPIA, May 21, 1875.

Transactions at the Philadelphia Stock market, during the past week, have been dull and devoid of interest. Sales of both stocks and bonds exhibit a decrease over those reported for the week ending the 14th inst, at a slight decline in quotations.

Quotations are as follows:

	Lowest.	Highest.	Closing.
Reading R. R. Co	52¼	53¾	53⅛
Lehigh Valley R. R. Co	60¼	61⅞	61¾
Little Schuylkill R. R.	—	—	49⅜
Catawissa R.R.	20¾	21	20¾
" " Preferred	—	—	42
" " New Preferred	38	38¼	38⅛
Huntingdon and B. T. R.R.	—	—	7
" " " Preferred.	—	—	14½
Minehill R.R.	—	—	53⅞
Lehigh Coal and Navigation Canal	50¼	50¾	50¾
Morris Canal	—	—	52
" Preferred	—	—	128½
Pennsylvania Canal	—	—	7¼
Schuylkill Navigation Canal	—	—	—
" " Preferred	—	—	14¾
Susquehanna Canal	—	—	7
Westmoreland Coal Co	—	—	80
Buck Mountain Coal Co	—	—	—
Cambria Iron Co	—	—	—
Locust Mountain Coal Co	—	—	..
Emaus Iron Co	—		—
Crane Iron Co	-		—

The following are the aggregate sales of stocks for the week ending May 19:

	Shares.	Price.
Reading Railroad	6,576 at from	52¼ to 53¼
Lehigh Valley RR. Co	405 "	60¼ " 61⅞
Little Schuylkill RR.	— "	— " —
Catawissa RR.	200 "	20¾ " 21
" " preferred	60 "	42 " —
" " new preferred	210 "	38 " 38⅛
Huntington & B. T. R. R.	— "	— " —
Huntington and B. T. RR., p'f'd	— "	— " —
Minehill RR.	9 "	53⅞ " —
Lehigh Coal and Navigation Canal	9,287 "	50½ " 50¾
Schuylkill Navigation Canal	100 "	7¼ " —
" " " p'f'd	— "	— " —
Morris Canal,	25 "	52 " —
Susquehanna Coal Co	.... "	— " —
Cambria Iron Co	— "	— " —
Pennsylvania Canal	.... "	— " —
Susquehanna Canal	.... "	— " —
Emaus Iron Co	.... "	— " —
Buck Mountain Coal Co	.... "	— " —
Total sales	16,869 shares.	
Sales for the week previous	40.322 "	
Increase	23,453 "	

Sales of the various bonds for the period under review have been as follows:

	Amount.	Price.
Reading RR. 6s, 44,80	3,000 at	102 to ....
Catawissa RR., new 7s	.... "	.. " ....
H. and B. T. RR., 1st mortgage, 7s	.... "	— " ....
Lehigh convt. gold loan	.... "	.. " ....
Pa. and N. Y. Canal, 7s	1,000 "	107½ " ....
Schuyl. Nav. 6s, '82	640 "	81⅛ " ....
L. V. RR. 6s, coup	.... "	.... " ....
H. and B. T. 1st Con. 7s, bonds	.... "	.... " ..
R. C. and I. Co. irregular mort. bonds, Brady Tract	.... "	.. " ....
Lehigh Nav. 6s, 1884	9,600 "	101½ " 102
Reading RR. debenture bonds	.... "	.. " ....
" " R. G. M. 7s. coup	2,000 "	108½ " ..
" " new convertible 7s	3,800 "	106¼ " ....
" " 7s, 93	1,000 "	107⅛ " ....
Reading C. and I. Co. debenture bonds,	.... "	.. " ....
Reading C. and I. Co. mort. bonds, Tamaqua Tract	.... "	.. " ....
Reading C. and I. Co. mort. bonds, St. Clair Tract	.... "	.. " ....
R. C. & I. Co, Wetherill tract	.... "	.. " ....
" " " " Locust Mountain Summit Improvement tract	.... "	.. " ....
R. C. & I. Co. Helfenstim tract	.... "	.. " ....
Lehigh Valley RR. Con. Mtge. 6s, reg.	.... "	.. " ....
" " " 7s	7,000 "	108¾ " 109
Lehigh Coal & Nav. Co. 6s, gold loan	15,500 "	102½ " 102¾
" " " " 6s, 1877	2,600 "	97 " ....
" " " " RR. loan	100 "	101½ " ....
Schuylkill Nav. 6s, '95	.... "	.. " ....
" " 7 per cent. boat loan	.... "	.. " ....
" " 6s, '72	.... "	.. " ....
" " 6 p.c. Impvt. loan	.... "	.. " ....
R. C. & I. Co., Glentworth tract	.... "	.. " ....
Chesapeake & Delaware Canal, 6s	.... "	.. " ....
Susquehanna Canal, 6s	.... "	.. " ....
Pennsylvania Canal, 6s	4,000 "	70 " ....
Shamokin Valley & Pottsville R.R., 7s	.... "	.. " ....
Allegheny Valley 7 3-10s	9,000 "	97 " ....
" " " Eastern Exte'n.	6,000 "	87½ " 88
" " " 7s	.... "	.. " ....
Del. Div. Canal, 6s	.... "	.. " ....
Morris Canal, 1st mtge. 6s	2,000 "	100 " ....
Total Sales	$66,640	

Gold and Silver Stocks.

SAN FRANCISCO, May 12, 1875.

An advance of $1 per share in Hale and Norcross, is the only exception to a still further remarkable decline in the San Francisco Stock List. This is a natural reaction from the inflated prices under the "Big Bonanza" excitement. Though we have favorable reports from nearly every Mining Company represented at the San Francisco Stock Board, some of the stocks exhibit a decline of nearly 50 per cent., as compared with our last quotations. Ophir is the most prominent item in the downward movement, being quoted at $39 per share, a decline of $33 from our quotations of the 12th inst. This Company made its first bullion shipment, May 3, amounting to $6,545, and on the next day the stock commenced to decline. Within the past thirty days it has fallen from 117 to 39, at which figure it stands to-day.

The Savage Mining Co. has levied an assessment of $5 per share, delinquent the 29th inst.

The Empire Mining Co. of Grass Valley has declared a dividend of 50c. per share, aggregating $5,000, May 15th.

Prof. J. L. SCHIRMER, of the U. S. Mint at Denver, Colorado, after a careful examination of the Comstock Lode, estimates that the product of the same for the current year will amount to $35,000,000, and for 1876, to $50,000,000.

The Bobtail Gold Mining Company, of New York, was merged into the Consolidated Bobtail Company, which purchased nearly every claim on the Bobtail Lode, Central City, Colorado, together with the two large fine quartz mills owned by the Black Hawk Mining Company. The mine and mills have been started up within the past few days, and 65 head of stamps are now running constantly.

The Manhattan Silver Mining Company, of New York, is now controlled by Pacific Coast capitalists, and the office has been removed to San Francisco. The mine recently shipped 7,545 lb. of bullion, valued at $100,154. This company paid $50,000 as dividends out of their earnings for April.

The Central Mining Company of New York, on a capital stock of $500,000, during the past 12 years paid $940,000 dividends.

In the Idaho District, work on the various mines is resumed more vigorously this spring than many anticipated, likely owing to the fact that Mahogany—the leading mine in that district—has struck quite a large body of ore. They claim to have at least 10,000 tons in sight, assaying not less than $50 per ton. The Mahogany has already made a shipment of bullion amounting to $11,600, and will soon be ready for another shipment. Three mills are being prepared to crush rock for the Mahogany alone.

The total shipments of treasure from San Francisco, from January 1 to May 6, 1875, amounted to $16,824,825, a portion of which came to New York, and the remainder went to Shanghai and Hong Kong. The total product of the Consolidated Virginia Silver Mine during the fiscal month just closed, was $1,509,144. The yield of the Chollar Potosi Silver Mine for the week ending May 8, was 237 tons of ore, of the average assay value of $232.10 per ton. The Colorado gold and silver mines produced last month $660,000; those of Utah produced $680,000.

The following dividends have been paid by the different companies mentioned, from their April earnings:

Eureka Consolidated Mining Co.	$50,000
Redington Quicksilver Co.	37,800
Jefferson Mining Co	25,000
Black Bear Quartz Co.	15,000
Excelsior Mining Co.	12,000

Quotations, May 19, 1875:

Gould & Curry	16	Overman	52
Savage	93	Raymond & Ely	41
Chollar Potosi	71	Eureka G. V.	7
Ophir	39	Best & Belcher	42
Hale and Norcross	36	Kentuck	13
Crown Point	30	Meadow Valley	7
Yellow Jacket	76	Alpha	17
Eureka Consolidated	47	Sierra Nevada	
Belcher	27	Union Consolidated	
Imperial	6	Mexican	14
Consolidated Virginia	395	Caledonia	14
California	52	Silver Hill	11

Copper Stocks.

BOSTON, May 20, 1875.

With the exception of a decided decline in Allouez, the market for Copper Stocks is generally steady. Small transfers of Calumet and Hecla have been made at our quotations. We note recent sales of Phœnix at $16 per share; 600 shares of Duncan Silver sold to-day at from $1 to 1½ per share.

Quotations are as follows:

Allouez	10⅜	National	3
Calumet and Hecla Co.	151	Petherick	1
Copper Falls	10½	Quincy	40
Central	31¾	Ridge	7
Franklin	14½	Pewabic	5

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OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. The ENGINEERING AND MINING JOURNAL, which is the Organ of the Institute, and contains its proceedings, transactions and notices of meetings, will be sent to each Member and Associate on the payment of his annual dues. Back numbers cannot, as a rule, be sent.

II. Dues (ten dollars per annum) are payable on election and at the annual (May) meeting. Members and associates elected at the February meeting pay ten dollars only to May of the following year. Remittances should be made, as far as possible, by P. O. Order, payable to the Secretary.

III. Blank proposals for membership can be had on application to the Secretary.

IV. The second volume of Transactions has been mailed to all home members and associates not in arrears. Any member who failed to receive his copy will please notify the Secretary promptly. The Institute is not responsible for the loss of the volume in those cases where members have changed their residences and have omitted to inform the Secretary. Volumes I. and II. will be sent, post-paid, to non-members, at five dollars each.

V. The Fifth Annual meeting will be held in Dover, N. J., commencing on Tuesday, May 25th. The Local Committee of Arrangements consists of Messrs. E. S. MOFFATT, E. CANFIELD, and FRED. A. CANFIELD.

The following is the programme of the meeting announced by the Local Committee:

Tuesday evening, session; Wednesday morning, excursion by special train to the Mount Hope mine; Wednesday, excursion to Chester mines and the Dickerson mine; Wednesday evening, session; Thursday, visit to the Hibernia or Mount Hope mine and the Canfield Collection of Minerals; Thursday afternoon and evening, sessions; Friday morning, excursion by rail to Hopatcong Station, thence by steamer up Lake Hopatcong to Noland's point; thence by special train on the Ogden Mine Railroad to the Ogden mine, thence by team to Ogdenburg for dinner; thence to Sterling and Franklin Zinc mines. From Franklin the members can take the evening trains to their respective homes. The order of the programme may be changed, however, to suit the convenience of members. Trains by Morris & Essex R.R. leave New York 8:10, A.M., 12, M., 4:10, 5:20, 7:45, P. M., and Easton, Pa., at 7:10, A. M., 1:05 and 6-45 P. M.

THOMAS M. DROWN, Secretary, Lafayette College Easton, Pa.

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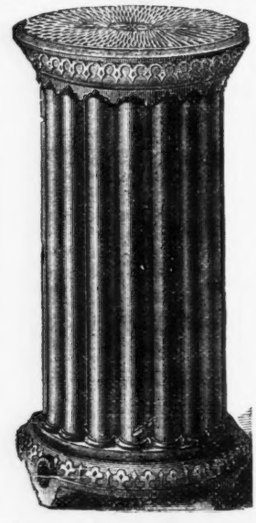

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NOTICE is hereby given that the annual meeting of the stockholders of the Scientific Publishing Company will be held on Wednesday, May 26, 1875, at 12 o'clock, at the office, 27 Park Place, New York City.

WM. VENTZ,
Secretary.

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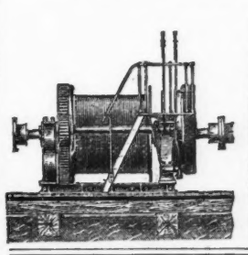

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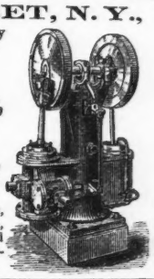

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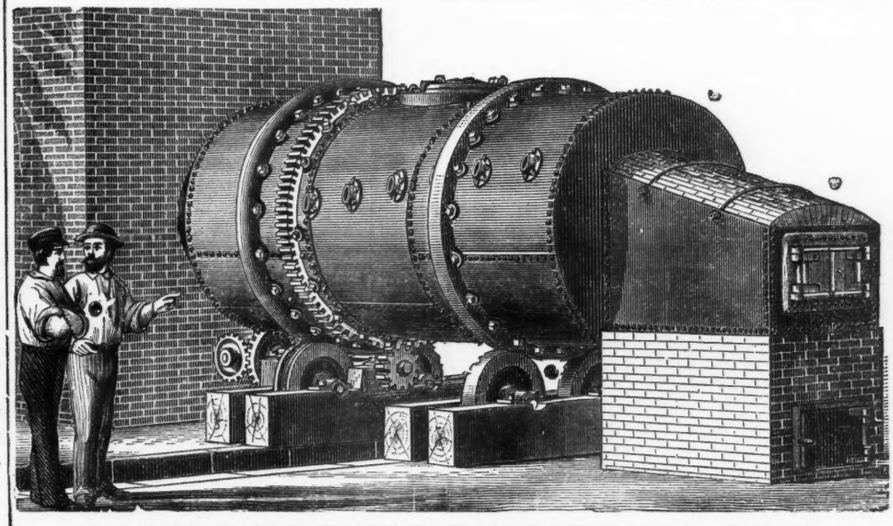

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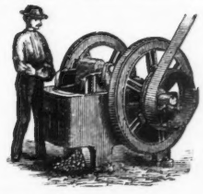

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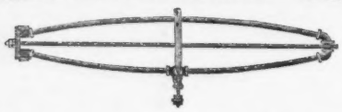

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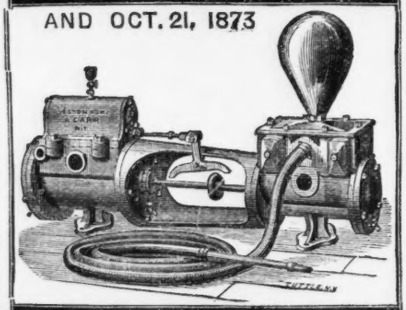

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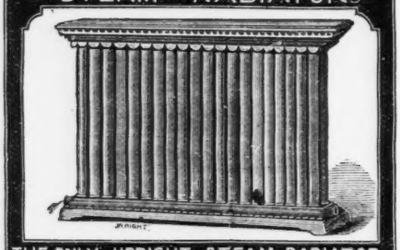

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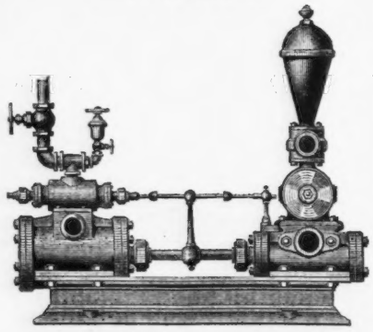

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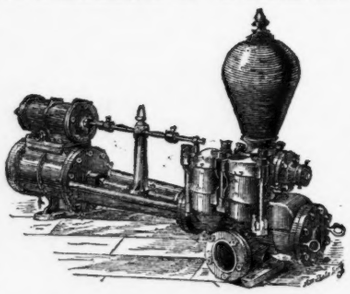

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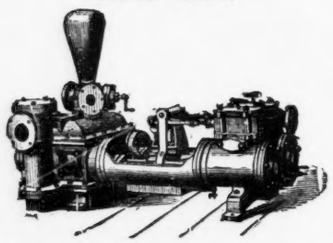

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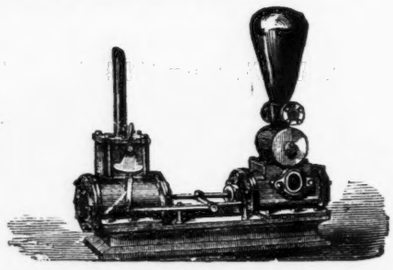

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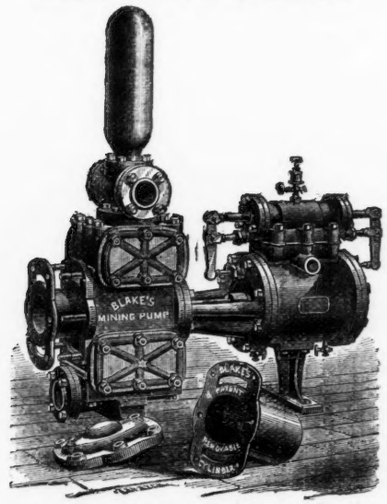

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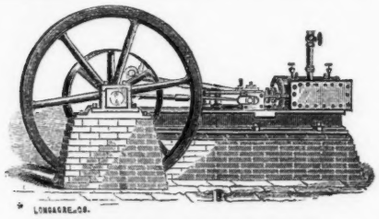

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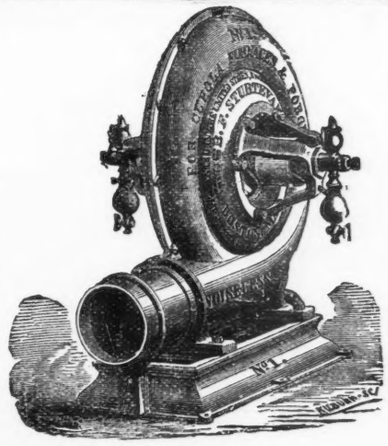

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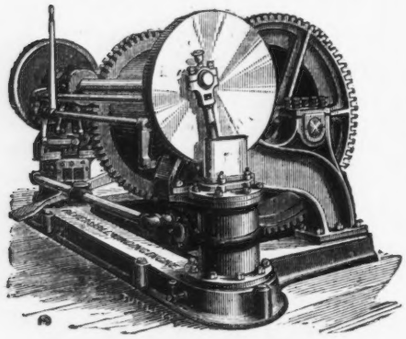

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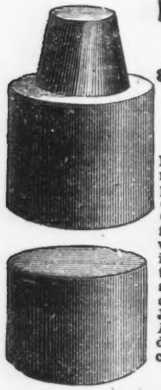

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